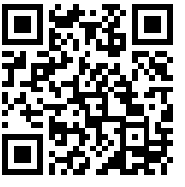
This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible.

Google™ books

https://books.google.com



Digitized by Google

THE UNIVERSITY

OF ILLINOIS

LIBRARY

620.5

RO

n.s, v. 12

~~ALTGELD HALL STACKS~~

Digitized by Google

Digitized by Google

Digitized by Google

REMOTE STORAGE

Digitized by Google

G20.5
RO
n.s., v.12

Digitized by Google

THE ROYAL ENGINEERS JOURNAL.

VOLUME XII.

JULY TO DECEMBER, 1910.

CHATHAM:
ROYAL ENGINEERS INSTITUTE.
AGENTS AND PRINTERS: W. & J. MACKAY & CO. LTD.

Digitized by Google

VOLUME XII.

No. 1.	JULY	Pages	1— 64
,, 2.	AUGUST	,,	65—144
,, 3.	SEPTEMBER	,,	145—234
,, 4.	OCTOBER	,,	235—314
,, 5.	NOVEMBER	,,	315—394
,, 6.	DECEMBER	,,	395—466

Digitized by Google

Subject Index.

Original Articles are entered in thick type; Translations, Reviews, and Notices of Magazines in thin type.

PAGE.

AERONAUTICS AND ITS PROGRESS IN CANADA, by Major G. S. Maunsell, R.C.E. 15

AEROSTAT, THE MILITARY USES OF THE, by Capt. P. W. L. Broke-Smith, R.E. 395

ARUVANKAD, A SPECIAL VITRIOL CHIMNEY AT THE CORDITE FACTORY, by Major F. A. Wilson, R.E. 161

ASKHABAD COURSE OF INSTRUCTION FOR OFFICERS OF RAILWAY TROOPS (from the *Razvyedchik*) 293

AUSTRIAN OPERATIONS IN NORTH ITALY IN 1848, by Capt. F. D. Irvine, R.E. 149

BOOKS RECEIVED 314, 391

BRIDGING BY NO. 1 COMPANY, 1st P.W.O. SAPPERS AND MINERS, DURING THE LAHORE DIVISION MANŒUVRES, 1909, by Lieut. W. Cave-Browne, R.E.... 65

CALCULATION OF WORKING PARTIES IN A DEFENCE SCHEME, by Capt. E. N. Mozley, R.E. 69

CANADA, AERONAUTICS AND ITS PROGRESS IN, by Major G. S. Maunsell, R.C.E. 15

"CARL BAYER" SUBMARINE AND SURFACE BOAT. (Translated from the *Kriegstechnische Zeitschrift* by Capt. C. Otley Place, D.S.O., R.E.) ... 59

CLIMB ON KOLAHOI, A, by Lieut. Kenneth Mason, R.E. 337

CORDITE FACTORY AT ARUVANKAD, SPECIAL VITRIOL CHIMNEY FOR, by Major F. A. Wilson, R.E. 161

CORRESPONDENCE :—

A Spanish Windlass, by Capt. A. L. Paris, R.E. 313

Militia Post, Miranshah, Tochi Valley, by Major D. H. McNeile, Commandant, N.W. Militia 466

CRYSTALLINE ROCKS, UNDERGROUND WATER IN, by Capt. K. E. Edgeworth, R.E. 239

DEFENCE SCHEME, CALCULATION OF WORKING PARTIES IN A, by Capt. E. N. Mozley, R.E. 69

DEMOLITION OF THE HUN-HO RAILWAY BRIDGE. (From the *Razvyedchik*) ... 453

DEPRECIATION, by Major W. A. J. O'Meara, C.M.G., late R.E. ... 39

Digitized by Google

PAGE.

FIELD AUTOMOBILE SEARCHLIGHT, by R.W. 57

FIELD COMPANY AT TRAINING AND MANŒUVRES, by Major A. F. Sargeaunt, R.E. 317

FIELD PRACTICE SUB-TARGET, by Capt. F. V. Thompson, R.E.... 403

FIRE TRENCHES, AN INVESTIGATION OF THE SECTION OF, by Capt. A. M. Cardew, R.E. 7

FORTIFIED POSITION OF NAN SHAN AND THE KUROPATKIN REDOUBT, by Major Don Augustín Scandella. (Translated from the *Memorial de Ingenieros* by 'M') 207, 381

FORTRESS MANŒUVRES (from the *Militär Wochenblatt*), by Major B. Atkinson, R.F.A., G.S. 109

GENERAL REPORT ON THE ENGINEER TROOPS OF THE ITALIAN ARMY, by Capt. Don Rafael Marín del Campo. (Translated from the *Memorial de Ingenieros* by 'M') 117

GIBRALTAR UNDER MOOR, SPANIARD AND BRITON, by Col. E. R. Kenyon, R.E. 165, 243, 319, 409

GIRDER ERECTION OVER ROHI BEAS, PUNJAB, BY NO. 1 COMPANY, 1st P.W.O. SAPPERS AND MINERS, by Lieut. O. E. U. Ingham, R.E. 235

GUNCOTTON, SOME REMARKS ON WET, by Bt. Major R. L. McClintock, D.S.O., R.E. 315

HYDRAULICS OF THE CHAGRES RIVER, by Gen. Henry L. Abbot, U.S. Army. (From *The Engineering Magazine*) 367

INVESTIGATION OF THE SECTION OF FIRE TRENCHES, by Capt. A. M. Cardew, R.E. 7

KOLAHOI, A CLIMB ON, by Lieut. Kenneth Mason, R.E. 337

MAGAZINES, NOTICES OF:—

Boletin Militar, by 'M' 305

Bollettino della Società Aeronautica Italiana, by Bt. Col. J. E. Capper, C.B., R.E. 63

Nature, by Maj.-Gen. W. E. Warrand, D.L., late R.E. 305

Revue Militaire des Armées Étrangères, by 2nd Lieut. A. H. Scott, R.E. 133, 307, 392, 456

Rivista di Artiglieria e Genio, by Col. Sir E. T. Thackeray, V.C., K.C.B., late R.E. 136, 311, 456

The Yamato-Damashii, by "C.F.R."... 142

Digitized by Google

PAGE.

MEMOIRS:—

Col. Henry Fyers Turner, C.B., R.E., by Col. R. H. Vetch, C.B., late R.E. 97

Major-Gen. Edward Renouard James, R.E., by Col. R. H. Vetch, C.B., late R.E. 191, 271, 355, 443

Major Philip Cardew, R.E., by Major L. Darwin and Col. G. A. Carr, late R.E. 283

MILITIA POST, MIRANSHAH, TOCHI VALLEY, by Major D. H. McNeile, 19th Lancers (Fane's Horse) 5

MILITARY USES OF THE AEROSTAT, by Capt. P. W. L. Broke-Smith, R.E. 395

NOTES ON PHOTOGRAPHY IN THE TROPICS, by Capt. H. G. Le Mesurier, R.E. (From *Photography and Focus*) 373

NOTES ON SEARCHLIGHTS, by R.W. 1

NORTH ITALY, AUSTRIAN OPERATIONS IN IN 1848, by Capt. F. D. Irvine, R.E. 149

RECENT PUBLICATIONS OF MILITARY INTEREST 225, 459

RECONNAISSANCE OF A FORTIFIED POSITION. (Translated from the *Renzhenernee Zhoornal* by Lt.-Col. F. E. G. Skey, R.E.) 295

REID, MAJOR-GENERAL SIR WILLIAM, G.C.M.G., K.C.B., F.R.S., R.E., by Col. R. H. Vetch, C.B., late R.E. ... 19, 83, 177, 255, 343, 427

REVIEWS:—

Field Telephones (Correction) 132

Construction of a House, by Charles Gourlay, A.R.I.B.A. 391

ROHI BEAS, PUNJAB, GIRDER ERECTION OVER, BY NO. 1 COMPANY, 1st P.W.O. SAPPERS AND MINERS, by Lieut. O. E. U. Ingham, R.E. 235

SEARCHLIGHTS, NOTES ON, by R.W. 1

SHIP STUDY OF H.M.S. *Indomitable*, by R.W. 105

SOME REMARKS ON WET GUNCOTTON, by Bt. Major R. L. McClintock, D.S.O., R.E. 315

SUB-TARGET, A FIELD PRACTICE, by Capt. F. V. Thompson, R.E. 403

TELEGRAPHY, WIRELESS—SOME UP-TO-DATE AMERICAN METHODS OF RECEPTION, by Lieut. A. C. Fuller, R.E.... 145

TELEGRAPHY OF PHOTOGRAPHS, WIRELESS AND BY WIRE (a *précis* of an article in *The Electrician*), by 2nd Lieut. A. H. Scott, R.E. 127

TRAINING AND MANŒUVRES, A FIELD COMPANY AT, by Major A. F. Sargeaunt, R.E. 317

TRAVELLING IN THE AIR, by Col. J. E. Capper, C.B., R.E.... 219

Digitized by Google

PAGE.

UNDERGROUND WATER IN CRYSTALLINE ROCKS, by Capt. K. E. Edgeworth, R.E. 239

VITRIOL CHIMNEY AT THE CORDITE FACTORY, ARUVANKAD, A SPECIAL, by Major F. A. Wilson, R.E. 161

WATER IN CRYSTALLINE ROCKS, UNDERGROUND, by Capt. K. E. Edgeworth, R.E. 239

WET GUNCOTTON, SOME REMARKS ON, by Bt. Major R. L. McClintock, D.S.O., R.E. 315

WIRELESS TELEGRAPHY—SOME UP-TO-DATE AMERICAN METHODS OF RECEPTION, by Lieut. A. C. Fuller, R.E.... 145

Digitized by Google

Index to Authors.

(Memoirs and Reviews Omitted.)

	Page.
Abbot, General Henry L.	367
Atkinson, Major B.	109
Broke-Smith, Capt. P. W. L. ...	395
"C.F.R."	142
Capper, Bt. Col. J. E. ...	63, 219
Cardew, Capt. A. M.	7
Cave-Browne, Lieut. W.	65
Edgeworth, Capt. K. E. ...	239
Fuller, Lieut. A. C.	145
Ingham, Lieut. O. E. U.	235
Irvine, Capt. F. D.	149
Kenyon, Col. E. R.	165, 243, 319, 409
Le Mesurier, Capt. H. G. ...	373
McClintock, Bt. Major R. L. ...	315
McNeile, Major D. H.	5, 466
'M.'	117, 207, 305, 381
Mason, Lieut. K.	337
Maunsell, Major G. S.	15
Mozley, Capt. E. N.	69
O'Meara, Major W. A.	39
Paris, Capt. A. L.	313
Place, Capt. C. O.	59
'R.W.'	1, 57, 105
Sargeaunt, Major A. F.	317
Scott, Lieut. A. H.	127, 133, 307, 392, 455
Skey, Lt.-Col. F. E. G.	295
Thackeray, Col. Sir E. T. ...	136, 311, 456
Thompson, Capt. F. V.	403
Vetch, Col. R. H.	19, 83, 177, 255, 343, 427
Warrand, Maj.-Gen. W. E. ...	305
Wilson, Major F. A.	161

Digitized by Google

Digitized by Google

CONTENTS.

PAGE.

1. NOTES ON SEARCHLIGHTS. By R.W. (*With Photos*) 1

2. MILITIA POST, MIRANSHAH, TOCHI VALLEY. By Major D. H. McNeile, 19th Lancers (Fane's Horse). (*With Plate*) 5

3. AN INVESTIGATION OF THE SECTION OF FIRE TRENCHES. Capt. A. M. Cardew, R.E. 7

4. AERONAUTICS AND ITS PROGRESS IN CANADA. By Major G. S. Maunsell, Royal Canadian Engineers. (*With Photos*) 15

5. MAJOR-GENERAL SIR WILLIAM REID, R.E., G.C.M.G., K.C.B., F.R.S. (*continued*). By Col. Robt. H. Vetch, C.B., late R.E. 19

6. DEPRECIATION. By Major W. A. J. O'Meara, C.M.G., late R.E. 39

7. TRANSCRIPTS :—

Field Automobile Searchlights. By R.W. (*With Photos*) 57

The "Carl Bayer" Submarine and Surface Boat. (Translated from the *Kriegstechnische Zeitschrift* by Capt. C. Otley Place, D.S.O., R.E.) ... 59

8. NOTICE OF MAGAZINE :—

Bollettino della Società Aeronautica Italiana. By Lt.-Col. J. E. Capper, C.B., R.E. 63

Authors alone are responsible for the statements made and the opinions expressed in their papers.

230885

Digitized by Google

Digitized by Google

CONTENTS.

PAGE.

1. BRIDGING BY No. 1 COMPANY, 1ST P.W.O. SAPPERS & MINERS, DURING THE LAHORE DIVISION MANŒUVRES, 1909. By Lieut. W. Cave-Browne, R.E. (*With Photos*) 65

2. THE CALCULATION OF WORKING PARTIES IN A DEFENCE SCHEME. By Capt. E. N. Mozley, R.E. 69

3. MAJOR-GENERAL SIR WILLIAM REID, R.E., G.C.M.G., K.C.B., F.R.S. (*continued*). By Col. Robt. H. Vetch, C.B., late R.E. 83

4. MEMOIR :—

Colonel Henry Fyers Turner, C.B., R.E. By Col. Robt. H. Vetch, C.B., late R.E. 97

5. TRANSCRIPTS :—

A Ship Study of H.M.S. *Indomitable*. By 'R.W.' (*With Photo*) 105

Fortress Manœuvres. (From the *Militär Wochenblätt*). By Major B. Atkinson, R.F.A., G.S. 109

General Report on the Engineer Troops of the Italian Army. By Capt. Don Rafael Marín del Campo. (Translated from the *Memorial de Ingenieros* by 'M.') 117

Telegraphy of Photographs, Wireless and by Wire. (A *précis* of an Article in *The Electrician*). By 2nd Lieut. A. H. Scott, R.E. 127

6. REVIEW 132

7. NOTICES OF MAGAZINES :—

Revue Militaire des Armées Étrangères. By 2nd Lieut. A. H. Scott, R.E. 133

Rivista di Artiglieria e Genio. By Col. Sir Edwd. T. Thackeray, V.C., K.C.B., late R.E. 136

The Yamato-Damashii. By "C.F.R." 142

Authors alone are responsible for the statements made and the opinions expressed in their papers.

Digitized by Google

Digitized by Google

CONTENTS.

PAGE.

1. WIRELESS TELEGRAPHY.—SOME UP-TO-DATE AMERICAN METHODS OF RECEPTION. By Lieut. A. C. Fuller, R.E. (*With Photos. and Plate*) 145

2. THE AUSTRIAN OPERATIONS IN NORTH ITALY IN 1848. By Capt. F. D. Irvine, R.E. 149

3. A SPECIAL VITRIOL CHIMNEY AT THE CORDITE FACTORY, ARUVANKAD. By Major F. A. Wilson, R.E. (*With Plate*) 161

4. GIBRALTAR UNDER MOOR, SPANIARD, AND BRITON. By Col. E. R. Kenyon, R.E. 165

5. MAJOR-GENERAL SIR WILLIAM REID, R.E., G.C.M.G., K.C.B., F.R.S. (*continued*). By Col. Robt. H. Vetch, C.B., late R.E. 177

6. MEMOIR :—

Major-General Edward Renouard James, Royal Engineers. By Col. Robt. H. Vetch, C.B., late R.E. 191

7. TRANSCRIPTS : —

The Fortified Position of Nan Shan and the Kuropatkin Redoubt. By Major Don Augustin Scandella. (Translated from the *Memorial de Ingenieros* by 'M.'). (*With Plates*) 207

Travelling in the Air. By Col. J. E. Capper, C.B., R.E. (*With Photos.*)... 219

8. RECENT PUBLICATIONS OF MILITARY INTEREST 225

Authors alone are responsible for the statements made and the opinions expressed in their papers.

Digitized by Google

Digitized by Google

CONTENTS.

PAGE.

1. GIRDER ERECTION OVER ROHI BEAS, PUNJAB, BY NO. 1 COMPANY, 1ST P.W.O. SAPPERS & MINERS. By Lieut. O. E. U. Ingham, R.E. (*With Photos*) ... 235

2. UNDERGROUND WATER IN CRYSTALLINE ROCKS. By Capt. K. E. Edgeworth, R.E. 239

3. GIBRALTAR UNDER MOOR, SPANIARD, AND BRITON (*continued*). By Col. E. R. Kenyon, R.E. 243

4. MAJOR-GENERAL SIR WILLIAM REID, R.E., G.C.M.G., K.C.B., F.R.S. (*continued*). By Col. Robt. H. Vetch, C.B., late R.E. 255

5. MEMOIRS :—

Major-General Edward Renouard James, Royal Engineers (*continued*). By Col. Robt. H. Vetch, C.B., late R.E. 271

Major Philip Cardew, Royal Engineers. By Major L. Darwin and Col. G. A. Carr, late R.E. (*With Photo*) 283

6. TRANSCRIPTS :—

The Askhabad Course of Instruction for Officers of Railway Troops. (From the *Razvyedchik*) 293

The Reconnaissance of a Fortified Position. (Translated from the *Kenzhenernec Zhoornal* by Lt.-Col. F. E. G. Skey, R.E.) 295

7. NOTICES OF MAGAZINES : –

Boletin Militar. By 'M.' 305

Nature. By Major-Gen. W. E. Warrand, D.L., late R.E. 305

Revue Militaire des Armées Étrangères. By Lieut. A. H. Scott, R.E. ... 307

Rivista di Artiglieria e Genio. By Col. Sir Edwd. T. Thackeray, V.C., K.C.B., late R.E. 311

8. CORRESPONDENCE : —

A Spanish Windlass. By Capt. A. L. Paris, R.E. 313

9. BOOKS RECEIVED 314

Authors alone are responsible for the statements made and the opinions expressed in their papers.

Digitized by Google

Digitized by Google

CONTENTS.

PAGE.

1. SOME REMARKS ON WET GUNCOTTON. By Bt. Major R. L. McClintock. (*With Photos*) 315

2. A FIELD COMPANY AT TRAINING AND MANŒUVRES. By Major A. F. Sargeaunt, R.E. 317

3. GIBRALTAR UNDER MOOR, SPANIARD, AND BRITON (*continued*). By Col. E. R. Kenyon, R.E. 319

4. A CLIMB ON KOLAHOI. By Lieut. Kenneth Mason, R.E. (*With Photos*) ... 337

5. MAJOR-GENERAL SIR WILLIAM REID, R.E., G.C.M.G., K.C.B., F.R.S. (*continued*). By Col. Robt. H. Vetch, C.B., late R.E. 343

6. MEMOIR :—

Major-General Edward Renouard James, Royal Engineers (*continued*). By Col. Robt. H. Vetch, C.B., late R.E. 355

7. TRANSCRIPTS :—

Hydraulics of the Chagres River. By General Henry L. Abbot, U.S. Army. (From the *The Engineering Magazine*) 367

Notes on Photography in the Tropics. By Capt. H. G. Le Mesurier, R.E. (From *Photography and Focus*) 373

The Fortified Position of Nan Shan and the Kuropatkin Redoubt (*continued*). By Major Don Augustín Scandella. (Translated from the *Memorial de Ingenieros* by 'M.'). (*With Plates*) 381

8. REVIEW :—

Construction of a House. By Charles Gourlay, A.R.I.B.A. 391

9. BOOKS RECEIVED 391

10. NOTICE OF MAGAZINE :—

Revue Militaire des Armées Étrangères. By Lieut. A. H. Scott, R.E. ... 392

Authors alone are responsible for the statements made and the opinions expressed in their papers.

Digitized by Google

Digitized by Google

CONTENTS.

PAGE.

1. THE MILITARY USES OF THE AEROSTAT. By Capt. P. W. L. Broke-Smith, R.E. 395

2. A FIELD PRACTICE SUB-TARGET. By Capt. F. V. Thompson, R.E. 403

3. GIBRALTAR UNDER MOOR, SPANIARD, AND BRITON (*continued*). By Col. E. R. Kenyon, R.E. 409

4. MAJOR-GENERAL SIR WILLIAM REID, R.E., G.C.M.G., K.C.B., F.R.S. (*concluded*). By Col. Robt. H. Vetch, C.B., late R.E. (*With Photo*) 427

5. MEMOIR :—

Major-General Edward Renouard James, Royal Engineers (*concluded*). By Col. Robt. H. Vetch, C.B., late R.E. 443

6. TRANSCRIPT :—

The Demolition of the Hun-Ho Railway Bridge. (From the *Razvyedchik*). (*With Photo*) 453

7. NOTICES OF MAGAZINES :—

Revue Militaire des Armées Étrangères. By Lieut. A. H. Scott, R.E. ... 455

Rivista di Artiglieria e Genio. By Col. Sir Edwd. T. Thackeray, V.C., K.C.B., late R.E. 456

8. RECENT PUBLICATIONS OF MILITARY INTEREST 459

9. CORRESPONDENCE :—

Militia Post, Miranshah, Tochi Valley. By Major D. H. McNeile, Comdt., N.W. Militia 466

Authors alone are responsible for the statements made and the opinions expressed in their papers.

Digitized by Google

Digitized by Google

Digitized by Google

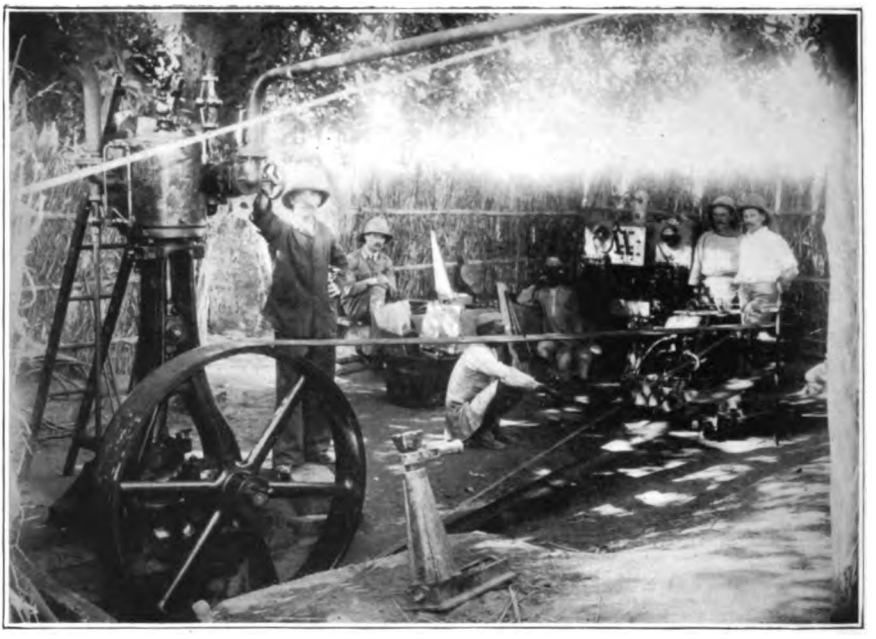


Photo I.

Photo II.

AN EXTEMPORIZED SEARCH LIGHT.

Digitized by Google

NOTES ON SEARCHLIGHTS.

By R.W.

As searchlights will, without doubt, play a very important part in the night operations in future wars, the following notes on the plant for an automobile searchlight, may prove of interest. An extemporized searchlight was also used in the recent Roorkee siege manœuvres, and extracts are given from the Report of Lieut. B. C. Battye who was in charge of the plant. These extracts show the various uses to which the searchlight was put, and the lessons learnt as regards its employment.

(1). Automobile Searchlight Plant.

It is quite evident that all the European Powers are adopting this type of "aid" to night fighting. They are however guided by the fact that the primary use for this plant is in siege warfare.

We are situated differently. On the Continent the practice of siege warfare, though next in importance to the field operations, does come second. With us the need for its consideration and practice is not very often realized by the Army at large.

One result of the Russo-Japanese War has been to show that searchlights must be included amongst the material provided and used by the fourth arm in the next war.

It would now appear to be our duty therefore to pass from the purely experimental stage to that of a recognized organization, which could take its place as an aid to infantry defence and artillery fire in the field, or be useful on lines of communication and in the attack of a fortress.

Our trials up to the present have resulted in the production of horse-drawn plant suited primarily to field operations. This type of plant could of course be used for siege operations, but the number of horses required would make it a serious undertaking.

In field operations the two main disadvantages of the automobile searchlight are

(*a*). That when employed in a defensive position the projector could never be retired in time (it is most useful naturally at short ranges), and would inevitably be captured.

(*b*). That it is never possible to state, with certainty, that the projector can be sited in any required position.

Digitized by Google

When teams of horses are used (*a*) can be overcome, for the case is similar to that of a field gun. Where, also, the projector can be detached from the trail carriage the disadvantage at (*b*) disappears and the searchlight becomes more mobile than the field gun, for it can be got into position on a church tower and no reasonable field site will be denied to it. The engine plant in being horsed, too, can always be got to within the required distance (300 yards) of its projector.

Other disadvantages are the necessity of having highly-trained *personnel*, and that automobiles at the front are generally a nuisance.

In siege warfare the disadvantages of an automobile plant disappear on the whole as the operations are more deliberate, and European Powers would appear to be working on these lines.

Another use is that, in coast defences, it is becoming more and more apparent that auxiliary mobile lights will be required to supplement the permanent lights during the precautionary and war periods. Reliable automobile sets might well be used for this purpose, their chief *rôle* being to co-operate with the mobile armament in repelling determined boat landings, or even assisting in the defence of the port on its land side.

(2). AN EXTEMPORIZED SEARCHLIGHT.

The following notes are extracted from a Report by Lieut. B. C. Battye who was in charge of a searchlight plant which was used in the recent Roorkee siege manœuvres (December, 1909).

The plant used included :—

1. A 90-c.m. coast defence Mark III. projector mounted in a bullock cart without motor-directing gear (see *Photo* 2).

2. 14-H.P. vertical steam engine and a compound wound (110 v. 200 a.) dynamo (see *Photo* 1).

3. A portable boiler borrowed from the Balloon Section.

The *personnel* consisted of 2 European non-commissioned officers, 21 native non-commissioned officers and sappers. The use of a power line 1½ miles long, made up of bare copper wires, was necessary on account of the immovability of the engine plant. The plant was taken over on November 13th, and the first trial run was carried out on November 20th. The manœuvre ground was 14 miles distant.

The light was run every night for a week, as under :—

In Attack.—(1). To assist a reconnaissance by night from a balloon. (2). To illuminate targets which were to be shelled by mountain artillery.

In Defence.—To disclose the attacking entrenching parties.

On one night the beam was reflected from a "home-made" metal

Digitized by Google

screen and howitzer practice was carried out against this at a range of 3 miles. Before firing took place the light was extinguished. The result of this practice was that all the shells fell within a few feet of the mirror, which would probably have been destroyed had they contained full charges.

The following lessons were learnt :—

(1). Some form of artificial command, for the projector, is an absolute essential in flat country. (2). Great care must be exercised in selecting a site for the light, to avoid any possibility of it being screened by any natural or artificial obstruction. (3). The observer should take advantage of every bit of command which he can get in the way of trees, houses, etc. (4). It might even be worth while carrying a portable mast to observe from, like those carried by wireless telegraph sections, which could be erected in the outpost line after dark and taken down before dawn. (5). It is worth while sacrificing some hundreds of yards in range, both for the light and the observer, if command can thereby be obtained. (6). The artillery observer should be as far ahead of the light as safety permits, and should be in close co-operation with the searchlight director.

Tactical Exercises Recommended.

There should be very close co-operation between the light and the infantry firing line, the light being actually directed from the firing line in attack practices. For this reason, one light should be told off for each section of the attack from as far to the front as possible, and each light should be actually directed by the O.C. of its own section. This needs a great deal of practice, to make it work properly.

Dousing and sudden exposure, in combination with magazine and machine gun fire, should be practised.

Reconnaissances should be practised, using a balloon and directing the light *from the balloon*. There is little doubt that excellent work could be done on a dark night in this way. The balloon is quite useless on a moonlight night, and probably even on a starry one.

Counter-attacks from a flank under the cover of the blinding effects of the beam should be practised.

Reconnaissances should also be practised from land by sending scouts out each at the end of a telephone line. The lines converge on to the director who should have established a post in the outpost line, and should then direct the light according to the information received from the scouts, who would observe and report in turn.

The only protection against artillery fire, would appear to be :—

Digitized by Google

Either by practising the Port Arthur ruse,* in the hopes that the artillery would give up attempting to hit the light, or else by arranging to move the projector quickly from one position to another, and back again as soon as the range was found.

It is interesting to know that this question is being at last taken up in India, but it would appear that the trials of a pack transport set would be in the first instance of more value. There are no great difficulties in the way of devising a complete pack set for one 30-c.m. electric light. The whole with stores could be carried by six mules, but practical experiments are most necessary before a final reliable and useful type can be evolved.

* This was—"To douse the searchlight when the firing was getting too hot, and to light up again some time after the firing had ceased."

Digitized by Google

MILITIA POST, MIRANSHAH, TOCHI VALLEY.

THE following short history of the Militia post at Miranshah, half-way up the Tochi Valley, is by Major McNeile, 19th Lancers, Commandant, Northern Waziristan Militia. It has been forwarded by Colonel J. A. Tanner, D.S.O., Secretary to the Chief Commissioner, N.W. Frontier Province, who has also kindly added a tracing of the post and a short account of its construction.

Up to October, 1904, there was a regular regiment of the Indian Army in Miranshah, the Northern Waziristan Militia holding the rest of the Tochi Valley. The Government of India however decided that from that time forth, the Northern Waziristan Militia were sufficient as a garrison for the whole valley, extending from Mirzail to Datta Khel. Since this distribution was to be permanent it was found necessary to build a new post at Miranshah for the headquarters of the Northern Waziristan Militia as the post which the regulars occupied was manifestly unsuitable for conversion to a permanent post, as the perimeter was too large for defence by the proposed new garrison, and in addition the sanitary arrangements were not such as to be suitable for permanent occupation.

Site of Post.—A suitable water supply was the main difficulty as regards the new site, but experimental wells were sunk and water was found on the Dandi plain at a depth of 120′. Two wells were then sunk and the new post built round them about 2 miles north of the Tochi River and 37 miles west of Bannu. As before mentioned the whole of the Tochi Valley is now occupied by the Northern Waziristan Militia, a local corps numbering 1,200 infantry and 100 mounted infantry, and like the other frontier corps, is under the control of the Honourable the Chief Commissioner, N.W. Frontier Province. The infantry are divided into 12 companies, 6 companies being composed of local men and the remainder of other classes of Pathans, *e.g.* Afridis, Khattaks and Orakzais. The Militia acts in concert with the Political Agent for maintaining peace in the valley.

The British officers numbering five, are selected from the Indian Army and are seconded from their regiments for three years for duty with the Frontier Militias, officers being liable to be transferred from one corps to another by order of the Chief Commissioner.

A portion of the post is divided off for the Political Agent, Tochi Valley, and his staff. Quarters are also provided in the Militia post for the Military Works Services Establishment.

Inhabitants.—The Tochi Valley is divided into Upper and Lower Daur. Lower Daur extends from Khajuri to within 5 miles of Miranshah. There are a few Tori Khel Wazir villages in the vicinity of Katira

Digitized by Google

otherwise the inhabitants are Daurs. The Daurs, being surrounded on all sides as they are by different Wazir tribes, have suffered considerably from their stronger neighbours. They are not properly speaking Pathans although they are a Pushtu-speaking race. They are supposed to be descended from one "Hussein" by a Mirasi wife.

On the north and north-west of Miranshah lies the territory of the Darwesh Khel Wazirs. The Darwesh Khels are a migratory tribe, their chief occupation being pastoral and it is in search of grazing for their flocks and herds that leads them to wander up and down their country. They are descended from one "Wazir" who had grandsons named Darwesh and Mahmud. Darwesh again had two sons Utman and Ahmad, and from these spring the whole Wazir race consisting of Mahsuds and the Darwesh Khels the two main clans of the Darwesh Khels being Utmanzais and Ahmadzais.

The Tochi Valley itself is extremely fertile, wheat and rice being chiefly grown. The cultivation however only extends from a short distance on each side of the river. All this cultivation belongs to the Daurs who are at present the only revenue-paying people in the valley.

There are many villages on both sides of the river. As a rule each village has a tower. These towers are usually well built and have a foundation of stone to a height of about 15′. Above this the tower is built of rough mud bricks to a height of 40′ or 50′. A roof is then put on and the beams of the roof project beyond the tower to a distance of 3′ or 4′ to form a machicoulis. On the top of all this there is usually a parapet.

As regards the construction of the post, with the exception of ammunition and arms stores, the work in the perimeter wall and in the buildings is practically all sundried brickwork. The Officers' Mess and quarters have jambs, arches and faces of exposed walls in burnt brickwork. The roofs are all mud on tiles. The whole post is surrounded by a wire entanglement which includes the stables and transport lines, these being placed outside the perimeter for sanitary reasons. These excrescences and the civil post are commanded from the walls of the Militia post.

Miranshah is the last headquarter post built for frontier corps, the others being Wana, which is reached from Dera Ismail Khan by the Gomal Road and is the headquarters of the Southern Waziristan Militia; Parachinar, at the head of the Kurram, 56 miles beyond railhead at Thal, is the headquarters of the Kurram Militia; Lundi-Kotal in the Khyber, about 30 miles from Peshawar being the headquarters of the Khyber Rifles.

The Samana Rifles have their headquarters at Hangu, about 30 miles west of Kohat and share with the regulars the holding of the Samana Ridge.

The Border Military Police help to keep order along the administrative frontier behind which are the regular garrisons.

Digitized by Google

AN INVESTIGATION OF THE SECTION OF FIRE TRENCHES.

Translated from the Japanese by CAPT. A. M. CARDEW.

THIS article is taken from a lecture, given by Capt. Uemura, Engineers, before the Research Society of the Nagoya garrison.

The object of fire trenches is the development of fire effect together with the protection of the garrison. It is therefore necessary that they should be constructed with a section that will enable the foregoing two objects to be attained, in other words every effort must be directed to thorough protection of the garrison so far as such will not impede firing.

Although what I am going to say about the degree to which the modern firearms affect the selection of such entrenchments, will of course be far from original, being matters of common knowledge, still I shall try to introduce to your notice one aspect of public opinion about the selection of fire trenches as opposed to modern firearms.

1. EXTERIOR SLOPE.

Since the exterior slope is the most external portion of the fire trench and receives by far the largest number of projectiles, the most advantageous method of construction would be to make it in precisely the same manner as the roof of a cupola, with a certain degree of slope given to it so that every projectile which struck it should be caused to ricochet off harmlessly.

Now, projectiles will usually ricochet when the angle of impact is less than 17°, that is, is less than 1/3·6, and the angle of impact of shells fired by long guns with fixed charges, at ordinary ranges, is far less than 17° and may be taken, as a mean, as 6°.

If therefore the angle of the exterior slope be made 17—6° or 11°, that is to say about 1/5, every projectile that hits the slope should ricochet. But, needless to say, in order to make the exterior slope more effective as a means of causing such ricochets, its surface must be well trodden down and consolidated.

2. SUPERIOR SLOPE.

In the present-day vogue of low parapets, the general custom is to make the superior slope horizontal; the reason being that on account of the lowness of the parapet the dead ground caused by such treatment is very small and almost negligible.

Digitized by Google

In the case of fire trenches in exceptional ground or for a special object, however, there is no objection to the use of any degree of slope; but in flat country, as mentioned in connexion with the external slope, a greater degree than 1 5 must be avoided on account of the object of causing projectile to ricochet.

Supposing that an angle of 1 5 be given, then the superior and exterior slopes would merge into one, and the section would become the so-called "triangular section." This section is held in especial favour in France, and appears to be very effective when employed in connexion with an obstacle. But though such prolongation of the slope should, in accordance with the theory, cause every flat trajectory projectile to ricochet, still the lips of the countless craters caused by curved fire projectiles would reduce the effectiveness of grazing fire, and lastly on ground of rather steep slope it would be almost impossible to construct such a parapet.

3. THICKNESS OF THE PARAPET.

If the parapet be given sufficient thickness to resist the penetrative power of the various natures of projectiles, it will be sufficient. Those thicknesses are laid down clearly in the *Provisional Field Fortification Manual* and need not be mentioned by me.*

* The table referred to is as follows:—

Against Rifle Bullets.

	Metres.	Approx.
Sand	0·75	2′ 5½″
Sand in sandbags	0·40	1′ 3¾″
Ordinary earth	1·00	3′ 3″
Piled-up sods, mud	2·00	6′ 6″
Consolidated snow	2·50	8′ 2″

Against Field Artillery Shell.

(*a*). Against shrapnel bullets or splinters—		
Ordinary earth	·4—1·0	1′ 4″ to 3′ 3″
(*b*). Against whole shell—		
Ordinary earth	1·0—2·0	3′ 3″ to 6′ 6″
Snow	about 8·0	about 26′

Against Field Howitzer Shell.

Ordinary earth—		
(*a*). Against shrapnel bullets and splinters	1·0	3′ 3″
(*b*). Against the whole shell ...	3·0—4·0	9′ 9″ to 13′

[TRANSLATOR.]

Digitized by Google

But, although in order to ensure safety against the penetrative effect of shell fired by long guns with fixed charges, a thickness of several metres must be provided, if as already stated means be adopted of making such shells ricochet, the protection of the garrison will be fully accomplished by the construction of a parapet with the exterior slope at an angle of 1/5 of a thickness of 1 m. (3′ 3″), which is sufficient to resist the penetrative effect of rifle and machine gun bullets.

4. Height of Parapet.

It being a matter of impossibility to protect the garrison, by means of field fortification, against the fire of high-angle fire common shell, the only point to be tried for is to make the enemy's correction of fire as difficult as possible. As a result the following two principles arise :—

(*a*). To reduce the height of the parapet as much as possible,

(*b*). To employ every means of making the fire trench difficult to be discovered by the enemy.

But if in order to carry out the first principle the parapet is made too low, the protection of the rear edge of the trench against the enemy's bullets becomes insufficient, the construction takes a long time, and the further disadvantage will be incurred that the rear edge of the trench is liable to be exposed to the enemy's view. And so, as laid down in the Manual, the parapetless style of trench cannot be made unless the ground is suitable and there is plenty of time, and thus is not a pattern to be invariably adopted. Although it is absolutely impossible to protect the rear edge of the trench by the height of the parapet against high-angle fire shells, still no great anxiety need be felt against low trajectory shells with a mean angle of impact of 6°, as the length of the safety zone given by a 0·50-m. (1′ 7½″) high parapet is about 5 m. (16½′).

Again, as the angle of descent of the lower edge of the narrow cone of dispersion of shrapnel is about 1/4, by making the slope of AB (see *Fig.* 1) steeper than 1/4 the interior of the trench can be protected against such fire. The standing position fire trench *Fig.* 2, and *Fig.* 3 and *Fig.* 5 fire trenches, fulfil this condition.

If the parapet err on the side of being too low, although its discovery will be made difficult, disadvantages will arise both in construction and in the degree of cover afforded. If, on the other hand, it errs on the side of being too high, albeit the cover may be thorough, the principle of concealment will be disregarded. A height of parapet of 0·50 m. (1′ 7½″) appears to be the golden mean, the reasons being that such a parapet is easy to construct and relatively difficult for the

Digitized by Google

enemy to correct his range by, and if suitable limits are placed to the width of the trench it enables a defilade of 1/4 to be obtained.

Fig. 5 with a height of parapet of 0·90 m. (about 3′) gives very thorough protection in the trench, but has the disadvantage of facilitating detection by the enemy. As laid down in the Manual, such things as the widening of trenches and the increase of the height of parapets in an infantry position, can only be carried out when the question of detection by the enemy no longer needs consideration. With regard to the question of rendering the detection of the trench difficult for the enemy, the avoidance of straight lines in the various slopes, which would cause lines of differing shades due to the light striking on their surfaces and which would be easily detected by the eye, and such means as the scattering of vegetation, earth, or grasses in the vicinity on the parapet, need no mention on my part.

But when the enemy employ balloons, it becomes extremely hard to render the discovery of trenches difficult, owing to the difference in colour between the trench and the parapet. However, a balloon sent up to the height of 1,000 metres (1,094 yards) at a distance away of 5,000 metres (5,468 yards) from a trench, observes the latter at an angle of 1 5, and so, theoretically, if the height of the parapet be made so that the line from the crest to the rear edge of the trench be 1/5, complete immunity should be obtained from the view of balloons. But in this case if the line of view from the balloon makes an angle of 45° horizontally with the crest line of the trench, the trench would be easily visible; and so it appears to be most important that the angle of defilade of the point A (see *Fig.* 1) should be at least 1/4.

Thus it will be seen that the angle of 1/4 laid down as necessary for protection against the enemy's bullets, also happens to give a good result in preventing observation from balloons. (The Japanese idea is that captive balloons cannot be sent up to a greater height than 1,000 metres or at a closer range than 5,000 metres).

5. Width of Trench.

For the reasons mentioned above, the width of the trench should be determined on a basis of the height of the parapet, but it is especially important to reduce the width against time shell. The reason is that by drawing the lines AC, BD, parallel to the lines *ac*, *bd* which shows the limits of the angle of dispersion (see *Fig.* 1), we find that, should the shell burst in the area between these lines, its effect is completely nullified. But, on the other hand, the trench occasionally has to be widened to facilitate communication. *Fig.* 4, designed for a protracted defence, is an instance of such.

In the case of this fire trench, defilade is a matter of the greatest difficulty owing to the width of the trench, but, as compared to

Digitized by Google

Fig. 5, the lower parapet would probably facilitate the carrying out of methods to prevent its detection by an enemy unprovided with balloons.

Moreover the Manual may be said to have taken every precaution by laying down that in such trenches as *Fig.* 4 the rear step should be made in the rear face of the trench as shown in *Fig.* 6, thus emphasizing the importance of defilade.

6. Interior Slope.

The necessity for making the interior slope steep is not only to reduce the distance AB, but also because it possesses another great advantage, the reason for this second advantage being as follows :—

High-explosive shells possess a wide cone of dispersion and adding the angle of descent, that is, 6° with the horizontal, the splinters reach the men behind the parapet at an angle of 61°.

The angle of a 3/1 interior slope to the vertical is 18°, and in this case the width of the defiladed area BPQ is only that subtended by an angle of 11°. And thus the width PQ of the protected area behind a parapet 1·30 m. (4′ 3″) in height, would not exceed 29 c.m. (11·4″). But if the interior slope be made vertical the width PR of the protected area becomes 0·72 m. (2′ 4″), and soldiers sitting with their backs to the parapet would be entirely protected.

For this reason, in all circumstances, it is most suitable to make use of any materials in the vicinity in order to try to make the interior slope vertical, and, if the nature of the soil permit it, advantage will be gained from undercutting the interior slope (Boer system of trench.—*Translator*).

The foregoing, however, has been argued from the point of view of fortification on level ground, and, needless to say, in some cases the employment of a less steep slope is possible.

7. Height of Line of Sight and the Firing Step.

According to one book the height of line of sight of 1·3 m. (4′ 3″) is argued to be suitable for a man 1·54 m. (Japanese 5·08 shahu, English 5·05′) in height, but the origin of the 1·54 m. (5·05′) of a man's height is not clear.

I only know that it is an average height of line of sight, but in the special circumstances which demand a non-steep interior slope, this height must be rather reduced.

If the firing step be too narrow, the firing motions are hampered and there is a fear of its collapsing, if it be too wide, it needlessly increases the width of the trench and makes the degree of protection insufficient.

A width of 40 c.m. (1′ 3¾″) appears to be the most suitable ; with such a width, when the men are resting seated on the step with their

Digitized by Google

backs to the vertical interior slope of a parapet 1·3 m. (4′ 3″) high, there is a protected area, as mentioned before, of 72 c.m. (2′ 4″) against the angle of descent of 61° of the lower portion of the cone of dispersion of high-explosive shells. And so beyond the 40 c.m. (1′ $3\frac{3}{4}$″) width of the firing step, there is a further width of 32 c.m. (1′ $0\frac{1}{2}$″) in which the man can put his legs with absolute safety.

Again, in the fire trench with a height of 1·10 m. (3′ 7″) and an interior slope at 5 1 as laid down in the Manual, a protected area of about 40 c.m. (1′ $3\frac{3}{4}$″) width is obtainable. In other words the firing step forms the protected area.

8. Elbow Rest.

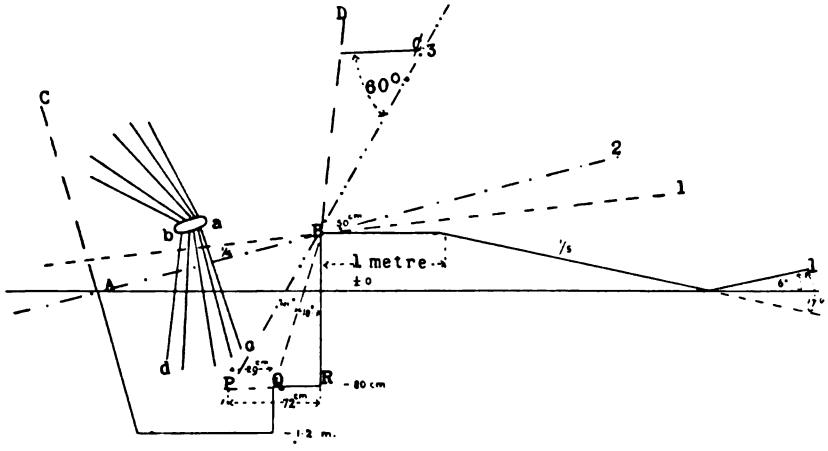
There appear to be several ideas as to the necessity or not of the elbow rest. In the recent war, according to the experience of a certain regiment, the men experienced no inconveniences as regards firing from a parapet without elbow rests, but found the picking up of ammunition from the bottom of the trench, in the confusion of night, very inconvenient; and from misapprehension were constantly complaining of lack of ammunition, when at daybreak in the bottom of the trench plenty of cartridges would be seen scattered about.

Looking at this it would seem that, if there was some other convenient method of storing ammunition in the firing line, the elbow rest could be abolished. But the harm ascribed to the elbow rest of reducing the effectiveness of protection for the trench, does not appear to be really so great as theory tells us; especially when the first consideration is that of the development of fire which is one object of the trench, such minute questions of defilade are not worth consideration.

In addition to the foregoing there are points in connexion with the rear edge of the trench, the bottom of the trench, etc., which are worthy of investigation, but since they follow naturally from the foregoing points, I shall not enlarge upon them.

Briefly, it is impossible practically to provide a fire trench with all the foregoing requirements as regards *remblai*, communication, etc., but if a knowledge of such be applied to the study of the sections laid down in the Manual, it will be seen that the various measurements are not arrived at by mere chance, and further it will be seen that each section has its own particular nature, in accordance with which each has a separate and distinct use.

Digitized by Google



1. 1. Mean angle of descent of trajectory (6°).
2. Angle of descent of lower edge of cone of burst of time shrapnel, and line of view from balloon.
3. Half the angle of burst (in vertical section) of high explosive time shell.

FIG. 1.

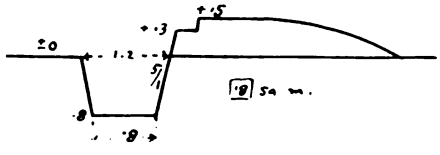


Fig. 2.

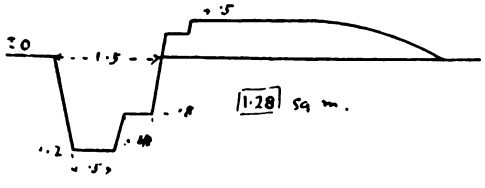


Fig. 3.

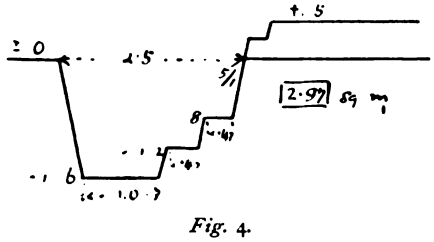


Fig. 4.

Digitized by Google

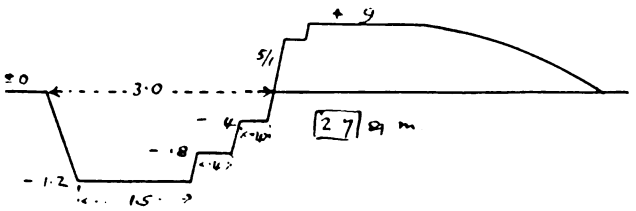


Fig. 5.

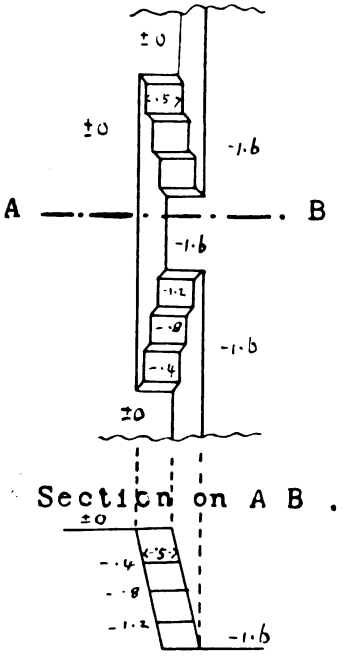


Fig. 6.

All measurements shown on the figures are in metres.

Digitized by Google

Digitized by Google

Digitized by Google

AERONAUTICS AND ITS PROGRESS IN CANADA

By MAJOR G. S. MAUNSELL, ROYAL CANADIAN ENGINEERS,
Director of Engineer Services, Canada.

CANADIANS have read, with great interest, the numerous articles written by Colonel F. G. Stone, *p.s.c.*, Royal Artillery, and Colonel J. E. Capper, C.B., Royal Engineers, in the Royal Artillery and Royal Engineer Journals, upon the advance in aeronautics up to the present date.

It might be interesting, in return, to give a few notes upon the progress made in this important and interesting study in Canada.

It will be remembered that, in July and August, 1909, Messrs. Baldwin and McCurdy experimented at Petawawa (the Central Canadian Camp) with two aerodromes,—the "Silver Dart" and "Baddeck No. 1." After several successful flights, the former, unfortunately, was badly damaged in landing, and the latter, while being adjusted, met with a mishap, which necessitated repairs and readjustment at their own workshops.

During the winter, these aviators have been busy, and were able, lately, to show how far they had progressed in the art of flying.

The writer was fortunate enough to have an opportunity of visiting the Canadian Aerodrome Company's Works, at "Beinn Breagh," near Baddeck, Nova Scotia, during the second week in March, and is indebted to Messrs. Baldwin and McCurdy for much of the information, and the plates contained in this article.

He was, also, fortunate in witnessing, as well as accompanying Mr. McCurdy, in flights in his "Baddeck No. 2," during Canadian winter weather, over a sheet of smooth ice, about a mile in width, and several miles long, the thermometer standing at zero at the time. The ice proved a very satisfactory starting and landing field, but great care had to be taken to prevent the machine from skidding against rough ice when alighting, which would have damaged the landing wheels.

In all these flights the extra weight of one passenger did not affect the machine in any way, and the aerodrome moved so smoothly, that a passenger could scarcely tell the moment the machine had left the ice, or when it landed again.

The longest flight made by "Baddeck No. 2" upon this occasion, was one half hour over the course above mentioned, making thirteen circles of about 1½ miles in circumference. The aviator then alighted,

Digitized by Google

(when that time had elapsed) as had been prearranged. The height was between 50′ and 100′.

The difficulties yet to be overcome, in all aerodromes, would appear to be—(*a*)—the question of certainty of power, (*b*)—the control in the wind, and, (*c*)—landing on, and rising from, uncertain ground.

With an absolutely reliable motor, there appears to be no reason in proper weather why these machines need come to the ground except to replenish their petrol. It is quite possible that future developments will adopt two motors, either one of which will keep the machine in the air.

In the case of the above aerodrome, the engines now under order by the firm are under a guarantee of an hour's flight.

The control in the wind has yet to be improved. Although no accidents have occurred to these aviators from that source, owing to their skill and caution, yet it is only fair to say that aviators prefer to fly in calm weather. Sudden gusts of wind, are, of course, most to be feared, but must be encountered and conquered.

It will be noticed that none of the machines, so far made by Messrs. Baldwin and McCurdy require a starting pole, but can lift from the ground in a few hundred yards run, on smooth ground. The landing question appears rather more serious. Ground, which from a distance looks sufficiently desirable as a landing place, may not prove so when reaching it, and the result may not be what was intended. But, as the engine power becomes more certain and control of the machine more perfect, this disadvantage will to a certain extent be eliminated.

The question of starting the engine without assistance must, also, be taken up before long. The machines mentioned in this article require the assistance of one man only at the propeller, to set the machine in motion, but, before regular flights can be made from place to place, it must be made possible for the pilot to set his engine in motion himself. This is now under consideration by these aviators.

The following aerodromes are about completed, and are being experimented with by the Canadian Aerodrome Company :—

"Baddeck No. 1" and "Baddeck No. 2" are biplanes of the type which so far proved themselves most satisfactory. They were built on the "Silver Dart" lines, but with many improvements. "Baddeck No. 2" is shown in *Photos* 1 and 2. The lateral balancing planes of the former are between the two main planes, and those of the latter are on the extreme ends of the main planes. In both cases, they are true planes not curved surfaces, and, when balancing is resorted to in the air, the rudder is not required to counteract this movement as in some machines.

The machine is controlled by the natural balance motions, *i.e.*—when the pilot wishes to lower the bow control he leans forward naturally and pushes the controlling wheel in that direction; when

Digitized by Google

leaning back and drawing it towards him, the bow control is lifted and an upward motion is effected. In a similar way, when leaning to the right when that side is high, the balancing planes are moved with the shoulders, and tend to lower that side, and *vice versâ*. The rudder is also guided by the same wheel as the bow control by a turning motion, and the engine throttle is secured to it as well. The pilot's hands therefore need not leave the controlling wheel.

The engine preferred so far by Messrs. Baldwin and McCurdy and installed in these machines, is a 6-cylinder, water-cooled, 40-H.P. gasolene motor-car engine, weight 320 lbs. Several radiators have been tried, including a specially made one of small resistance in the air, which has proved very satisfactory.

The propeller now in use, after careful experiments, is a 7′ 6″ two-bladed one, made of British Columbia fir and with moderately sharp blades.

The bow controls and tails of these machines require no particular description. They are shown in *Photo* No. 1, and give great stability. The surfaces are slightly curved in the same way as the main planes.

The three landing wheels are of bicycle pattern (pneumatic) and are secured upon heavy coil springs to a small wooden frame. This frame acts as a skid if a wheel gives way, and protects the body of the machine. The advantage of this skid was shown in the tests made on the ice recently, where a wheel broke through the surface when alighting, but the main planes were carried on the skid.

The framework of the main planes is made of British Columbia fir; the struts between the two planes are of the same material. The covering is a special material of silky cotton appearance, strong and light. The edges of the main planes are covered with aluminium.

"Oionos" is a triplane of tetrahedral design. This particular construction has been a study of Dr. Graham Bell's for some time. It has been proved that kites of this design fly well, but in the full-sized machines would appear to offer too much resistance, and are too heavy. The "Oionos" has not yet been tried with a sufficiently powerful engine to lift her, but has been run over the ice with a small 12-H.P. engine to test her balance, etc. The result of her proper test will be most interesting. This type is shown in *Photos* 3 and 4, and is controlled in a similar manner to "Baddeck Nos. 1 and 2." The bow control and tail are also very similar in construction to those of the first-mentioned types. The engine proposed is a 40-H.P.

The "Oionos" is the result of tests carried out with the "Cygnet" which is of tetrahedral construction but of numerous small silk-covered cells. It is one of the older types, and has not proved satisfactory, but as a kite it flew well.

The "Mike" monoplane is the first monoplane built by the Canadian Aerodrome Company, and is, also, their first order. It is

Digitized by Google

being built for Mr. Gardiner G. Hubbard, of Boston, U.S.A. This machine is shown in *Photo* 5; is 34′ from tip to tip of wings, and 32′ from propeller to rudder. The engine is a 40-H.P., similar in type to the biplanes above mentioned, and placed in the body immediately in rear of the propeller. The control motions are similar to those described for the biplanes, but the elevating and depressing plane is in the tail.

This is the smallest full-sized aerodrome made by these aviators. A delay in the delivery of the engine prevented its being tried at the recent ice tests. It gives one the impression of being a very fast machine. Whether it will be as stable as the biplanes above described, has yet to be proved.*

Hydroplanes are being experimented with by this firm, and great strides are being made. It is expected before long to have an aerodrome that will rise from the water and be capable of landing again in it with safety.

Ice Motor Boats are rather novel, but successful machines, made and used by these aviators for getting from place to place on the ice. They are of very simple construction, with three skate-like runners, one in front guiding the machine. A motor, borrowed from a motor boat for the winter, answers the purpose and an ordinary wooden propeller driven in the air, completes the machine (see *Photo* 6).

Messrs. Baldwin and McCurdy make all parts of the aerodromes in their factory, even the bicycle wheels used in the landing carriages (except the rims, tires and spokes).

They are much handicapped by the want of a large training ground for summer use. (The ice training ground, above mentioned, is a luxury which is only available for a few weeks in the year). The country surrounding Baddeck is hilly, and an aerodrome to soar across country, must rise about 1,000′ above sea level.

The term "aerodrome" is used by these aviators instead of "aeroplane," as the latter is not considered applicable to a machine which is made up of curved surfaces and not planes.

Messrs. Baldwin and McCurdy are most fortunate in having the advice of such an inventor as Dr. Graham Bell to guide them in their work, as although they are mechanical engineers, and thoroughly well up, both technically and practically in their work, the advice of such a genius as Dr. Bell must be of the greatest value to them.

* Since the writer's visit to Baddeck, this machine has been tested, and made a number of very successful flights, with Mr. Hubbard as aviator.

Digitized by Google

MAJOR-GENERAL SIR WILLIAM REID, R.E., G.C.M.G., K.C.B., F.R.S.

(*Continued*).

By Col. Robt. H. Vetch, c.b., late R.E.

Reid arrived at Negril Bay, Jamaica, with Major-General Sir Edward Pakenham and his Staff on the 13th December, 1814, to find that Major-General Lambert with his troops, who had sailed from England a week earlier, had only just reached the rendezvous. As we have already seen, the Admiral, Sir A. Cochrane, with the force from the Chesapeake, and the reinforcements brought out by Major-General Keane, were already before New Orleans, and were busy destroying the enemy's flotilla of gunboats and disembarking the troops, at the time of Pakenham's arrival at Negril Bay. He does not seem to have had any certain information of the whereabouts of the Admiral and Keane, but he decided to proceed without delay to New Orleans, the object of the expedition; and directing Major-General Lambert to follow as soon as possible, he sailed at once in H.M.S. *Statira* for that city.

The following is an extract from Burgoyne's journal :—

"*December 13th.*—At 8 a.m., while hauling round North Negril Point, fell in with the *Vengeur* (74) with her convoy, General Lambert and about 2,000 troops—7th Fusiliers, 43rd Regiment, etc. The *Vengeur* made the signal for us to speak, and the captain (Ricketts) and General Lambert came on board. After a consultation we left them laying-to off Negril, and made sail for the channel round the west point of Cuba. The *Vengeur* and convoy sailed from Plymouth a week before us for the same destination and service. We suppose they will now water in Negril Bay before they continue. Sir Alexander Cochrane was to have brought down the army lately under General Ross, together with the reinforcements they had received, consisting principally of 2,000 men under General Keane, who sailed from England nearly two months before us.

"*December 21st.*—In the evening we ran into the bay to the west of the mouths of the Mississippi, and at 15 miles distance could not see the land.

"*December 22nd.*—We learn that the Admiral and fleet are laying to the north of the Chandeleur Islands preparatory to landing the troops up Lake Pontchartrain. Five gunboats have been taken thereabouts out of six, and the other destroyed.

"*December 25th.*—Landed near the Mississippi with Sir Edward Pakenham."

Digitized by Google

Sir Edward and his staff had left their ships on the 24th and proceeded in boats for 40 miles, reaching the *Britannia* transport at 10 p.m. Here they learned that there was another 30 miles before them. They reached the landing place at the head of the creek next day, the 25th, Christmas Day, at 11 a.m. and had to traverse a marshy footpath along the bank of a little canal, or bayou, which extended from the creek almost to the Mississippi, for over 2 miles before reaching the headquarters of the army. They found the army on the ground on which they had fought on the 23rd, the number of men landed having been increased to 3,500. Pakenham arrived to find his troops brought into a situation from which all his abilities could scarcely expect to extricate them. On the 28th a forward movement was made and the troops arrived within half a mile of the first line of entrenchment. Batteries were then thrown up which opened fire on New Year's Day. The result was unsatisfactory and the guns were withdrawn at night. On the 4th January General Lambert's reinforcements came up. A small canal was cut from Lake Pontchartrain to the river to convey boats into the Mississippi, carrying a storming party to attempt the capture of the 20-gun battery on the opposite bank. The whole enterprise miscarried. The 42 ships' boats to carry 1,400 men under Colonel Thornton to storm the battery could not get through the canal. The soil through which the canal was dug, being soft, parts of the bank gave way, and choking up the channel prevented the heaviest of the boats from getting forward. These again blocked up the passage to those behind and thus only boats containing some 350 men reached their destination. Even these did not arrive at the appointed time. By sunrise on the 8th January Colonel Thornton was to have carried all the batteries and pointed the guns, when, on the throwing up of a rocket he was to begin firing upon the enemy's line, which, at the same moment was to be attacked by the main army.

As day broke on the 8th and the signal rocket went up Colonel Thornton with barely 350 men was moving out of the canal and in silence and with muffled oars was pulling away in the river to the batteries, 4 miles away, which should have been captured hours before. In the meantime the main body had moved forward in front of the piquets, but Pakenham found that the 44th Regiment, which had been ordered to carry the fascines and ladders for crossing the ditch and scaling the ramparts, had left them behind. The situation was difficult and Pakenham decided to advance, trusting that if Thornton had not succeeded he would at least have created a diversion. A 3-gun battery was stormed and taken but was recaptured; with no ladders the odds were awful. The 44th Regiment was sent back for the ladders, and after it returned with them Pakenham was leading it on to the attack, when he was killed by a bullet. On the other side Thornton had routed the outposts and then captured the batteries in

Digitized by Google

spite of a storm of fire. General Lambert having succeeded to the command recalled the troops out of the heavy fire to which they were exposed, and in spite of the capture of the batteries by Thornton, a council of war decided to abandon the undertaking and retreat to the ships.

In this unfortunate business Lieut. Wright, R.E., the gallant young subaltern who had earned for himself a reputation in the Peninsular War similar to that won by Reid, and who had been engaged in many of the same sieges, was killed. The Duke of Wellington used jocosely to couple the names together of these two of his favourite youngsters, and called them "Read and Write."

To cover the disaster at New Orleans from which General Lambert had withdrawn against the advice of his Commanding Royal Engineer, it was decided to attack Fort Bowyer, a strong work at the point of the bay leading to Mobile. The troops were landed on the 8th February and the fort invested. Burgoyne was Commanding Royal Engineer and Reid, who had been promoted 2nd Captain on the 20th December, 1814, was among the officers employed. A parallel was opened the same night. Batteries were constructed and armed, and on the 11th the fort was summoned. The commander capitulated, and on the following day the garrison 400 strong surrendered themselves as prisoners of war. On the 13th February, 1815, news arrived that the war was at an end, peace having been signed at Ghent on December 24th of the preceding year! Reid returned to England with the expedition in May, 1815.

Capt. Reid had no sooner set foot on shore in England than he was ordered to join Wellington's Army in the Netherlands. Napoleon, having escaped from Elba, had returned to Paris in March, and the services of all available officers of Royal Engineers were urgently required in the Netherlands—the cockpit of Europe—where the contest between Europe and the French Emperor was to be fought to a conclusion.

Wellington had asked that the whole Corps of Royal Sappers and Miners should be sent to join his army. Seven companies of that Corps, officered by Royal Engineers, were hurried to Ostend between the 24th March and the 10th June, 1815. Reid joined the army on the 9th June. The Royal Engineers and the Royal Sappers and Miners were distributed among the frontier posts and fortresses that most required their service. Very few officers of the Corps were therefore present at the Battle of Waterloo, but most of them accompanied the army of the allies on the march to Paris and Capt. Reid was among them. Sir Henry Cole mentions in his *Fifty Years of Public Work* that he recollects Reid telling him of his experiences on the march when one of his duties was to cut the roads leading to Paris so as to make them impassable to the French Army. Reid was present at the capture of Paris and took part in the triumphal entry of the allied army into the city on the 7th July, 1815.

Digitized by Google

While Reid was employed with the Army of Occupation in Paris he was greatly concerned to find that no promotion to the brevet rank of Major was given him, although he had been a Captain for many months. No longer could want of precedent be urged against his promotion, and he began to think that his case had been forgotten. After consultation with some of his brother officers he decided to write officially to the Commanding Royal Engineer on the subject, and to request that his letter might be submitted to His Grace the Duke of Wellington.

The following is a copy of the letter written :—

Letter from Capt. William Reid, R.E., written at Paris in 1815 *to Colonel Carmichael Smyth, Commanding Royal Engineer of the Army of Occupation.*

"SIR,

"Sir Richard Fletcher, when on leave of absence in the winter of 1812–13, having had several communications with H.R.Highness the Duke of York concerning the promotion of subalterns of Engineers who should be considered worthy of advancement, and having proposed to H.R.Highness that the late Lieut. Wright and myself should have the rank of Captain, the Duke objected to giving brevet rank to subalterns; this occasioned a memorial to His Grace the Duke of Wellington previous to opening the campaign of 1813, which His Grace forwarded to the Commander-in-Chief but with no further success.

"Sir R. Fletcher having frequently assured me that it was his intention to push this matter, or in case that it was inadmissible, to recommend Lieut. Wright and myself for a step when we should have attained the rank of Captain by regular rotation, I have been induced to beg of you to submit this to His Grace the Duke of Wellington, in the hope that I may now receive the rank which a rule of the Service* prevented my receiving while a subaltern.

"With regard to my services: I served the last four years and a-half of the Peninsular War with H.G. the Duke of Wellington. I have been at seven sieges, five general actions, besides a great many smaller affairs; having served two years (1813 and 1814) as senior officer of Engineers with the Light Division; during which services I received three wounds and lost three horses shot under me.

"During the short interval of peace with France I was in the Gulf of Mexico, and on the 9th June I rejoined the army in the Netherlands.

"I have, etc.,
"WM. REID,
"2nd Capt., R. Engrs.

"To COLONEL C. SMYTH, Commg. R. Engr."

On the reduction of the British Army of Occupation in France, which took place in January of the following year, Capt. Reid returned home and was given two months' leave of absence. He no doubt spent part of this time with his aged father in Scotland. He

* Note by Sir William Reid: "I had not served seven years, the time required by the Regulations."

Digitized by Google

had, however, seen some of the officials at the Board of Ordnance as to his grievance, and one of them sent him the following letter :—

Letter from Major William Gosset, R.E., to Capt. William Reid, R.E.*

"JERSEY, 23*rd February* (1816).

"MY DEAR REID,

"Before I left London I saw Lord Mulgrave.† I again pressed your case upon his lordship, but he fought off upon the old ground: your case is the hardest of that nature that ever occurred. Suppose you were to draw up a memorial of your services, accompanied by the many testimonies which you have, and can procure, and present the same to the Master-General, making it as strong as possible. . . .

"Yours very truly,

"WM. GOSSET."

The fact was that most unfortunately for Reid's interests a matter was at this time in dispute, in which he was in no way concerned, but which proved for a time fatal to his hope of promotion.

The "old ground" referred to in the letter evidently means the determination of the Master-General of the Ordnance to give no officer of the Corps brevet rank until the question of succession to a vacant colonel commandantship was settled. The question was whether the vacancy should be filled, as of old, by regimental seniority, or whether, since the removal of general officers other than colonels commandant from the active list of the Corps in December, 1814, they were to be eligible for colonel commandantships according to Army seniority. Until this question was settled the Master-General would not recommend any officer for brevet promotion which might serve as a stepping-stone to the battalion.

In March, 1816, Reid was ordered to join at Woolwich, and in the following month he was appointed Adjutant of the Royal Sappers and Miners, whose headquarters were then at Woolwich. But he was not yet to be allowed to settle down to the prosaic duties of an Engineer officer in time of peace. Another opportunity was to be given him to distinguish himself on active service, and this time after a different fashion to any former experience. A few words are necessary to explain how the occasion arose.

During the great wars that took place in Europe between 1793 and 1815, the pirates of the Barbary States carried on their predatory warfare with little check from the naval powers. Both Lords St. Vincent and Nelson, it is true, had chastised them, and more recently the American Commodore, Stephen Decatur, had given them severe punishment, but they continued to seize trading vessels in the Mediterranean, and to consign all captured Christians to slavery. At the time at which we have now arrived—the spring of 1816, renewed

* Afterwards Major-General Sir William Gosset, Kt., K.C.H., C.B., who died in 1848.

† Master-General of the Ordnance.

Digitized by Google

outrages had led the British Government to send Admiral Lord Exmouth to the several Barbary States to demand the liberation of all Christian slaves who were subjects of our allies. The Beys of Tripoli and Tunis promised compliance with all the demands that were made; but the Dey of Algiers would not consent to abolish the practice of Christian slavery without the sanction of the Sultan of Turkey, and time was allowed him to communicate with Constantinople. This service being accomplished, the Admiral set sail for England. Scarcely had he quitted the Mediterranean with his squadron when a number of Christians, employed in the coral fisheries at Bona, were wantonly murdered by the Algerines. When intelligence of this atrocity was received in England it was determined to send out Lord Exmouth with a squadron to bombard the Dey's capital.

Under the idea that it might become necessary to land a party to destroy some of the batteries and works protecting the harbour of Algiers, Major William Gosset, R.E., was sent with the 7th Company of the 1st Battalion of Royal Sappers and Miners, commanded by Capt. Reid, with three subalterns under him—Lieuts. Whinyates,* Lempriere† and Hotham,‡ to join the fleet.

Lord Exmouth hoisted his flag on board the *Queen Charlotte*, 100, Capt. Brisbane, and sailed from Plymouth with a large squadron on the 26th July, 1816. He had with him the *Impregnable*, 98, Capt. Brace, C.B., bearing the flag of Rear-Admiral David Milne, his second in command; *Superb*, 74; *Minden*, 74; *Albion*, 74; *Leander*, 50; *Severn*, 40; *Glasgow*, 40; *Granicus*, 36; *Hebrus*, 36; *Heron*, 18; *Mutine*, 18; *Prometheus*, 16; and 40 or 50 gun vessels, bomb vessels, etc.

Reid's company was 84 strong, and was divided between the *Queen Charlotte* and the *Impregnable*, the two flagships. Major Gosset, Capt. Reid, and Lieut. Lempriere were in the *Queen Charlotte*, with 45 rank and file while Lieut. Whinyates was in the *Impregnable* with 39 rank and file, and Lieut. Hotham was in the *Minden*.

The fleet arrived at Gibraltar on the 9th August and found there a Dutch squadron under the command of Vice-Admiral Baron T. F. van Capellen, consisting of four frigates of 40 guns and two sloops of 30 and 18 respectively. The Dutch Admiral proposed to Lord Exmouth that he should co-operate with him in the action about to be taken, to which his lordship readily agreed. On the 14th August, 1816, the combined fleet left Gibraltar for Algiers.

In his despatch Lord Exmouth says:—

"An adverse wind destroyed the expectation of an early arrival (at Algiers), which was the more anxiously looked for by myself, in consequence of hearing the day I sailed for Gibraltar, that a large army had been assembled, and that very considerable additional works were throw-

* Afterwards Major-General Frederick William Whinyates, who died in 1881.

† Lieut. Thomas Lempriere, died in 1820.

‡ Afterwards Capt. George Hotham, who retired in 1839 and died in 1860.

Digitized by Google

ing up, not only on both flanks of the city, but also immediately about the entrance of the Mole; from this I was apprehensive that my intention of making that point my principal object of attack had been discovered to the Dey. . . . This intelligence was greatly confirmed by the *Prometheus*, which I had despatched to Algiers some time before to endeavour to get away the Consul. Capt. Dashwood had with difficulty succeeded in bringing away, disguised in midshipmen's uniform, his wife and daughter, leaving a boat to bring off their infant child, coming down in a basket with the surgeon who thought he had composed it but it unhappily cried in the gateway, and in consequence the surgeon, three midshipmen and in all 18 persons were seized and confined as slaves in the usual dungeons. The child was sent off next morning by the Dey and, as a solitary instance of his humanity, it ought to be recorded by me.

"Capt. Dashwood further confirmed that about 40,000 men had been brought down from the interior and all the janissaries called in from distant garrisons, and that they were indefatigably employed on new batteries, gunboats, etc., and everywhere strengthening the sea defences. The Dey had closely confined the Consul, and refused either to give him up, or promise his personal safety; nor would he hear a word respecting the officers and men seized in the boats of the *Prometheus*."

Algiers was a very strong place, well defended with batteries mounting in all over 1,000 guns. Of these 80 guns were on the north side, where the shoalness of the water prevented any large ship getting within range. About 220 were on the Mole, 50 on the east sea front, and the rest in batteries on the high ground behind the town. There were in the harbour four 44-gun Algerine frigates, five large corvettes of from 24 to 30 guns each, and some 40 to 50 gun and mortar boats. The garrison of the place was estimated at 40,000 Moors to which had been added the large force mentioned by Capt. Dashwood.

It was on the 16th August that the *Prometheus* from Algiers rejoined the fleet, but owing to the adverse winds it was the 26th before the land to the westward of Algiers was made. Next morning at daybreak the British and Dutch fleets came in sight of the city and, being becalmed, Lord Exmouth despatched a boat under cover of the *Severn*, 40, with a flag of truce and the demands he had to make. These were the release of all Christian slaves, the repayment of ransoms exacted by the Moors, and the liberation of the British Consul and sailors.

After a delay of three hours, during which the sea breeze had enabled the fleet to reach the bay, the boat was seen returning with a signal flying, that no answer had been received. Lord Exmouth made signal to know if the ships were all ready, and being answered in the affirmative the *Queen Charlotte*, followed by the rest of the fleet, bore up for the appointed stations. At 2.35 p.m. the *Queen Charlotte* anchored, with springs in her cables, about 50 yards from the Molehead and shortly afterwards the battle began by a shot fired

Digitized by Google

from the shore at the *Queen Charlotte*. The positions were from the north:—*Impregnable*, 98; *Albion*, 74; *Minden*, 74; *Superb*, 74; *Queen Charlotte*, 100. Then 2,000 yards N.E. of the Mole, the bomb, gun, mortar, and rocket vessels. The bombardment was of the fiercest character and was maintained till 10 o'clock at night. The Royal Sappers and Miners and the officers of Royal Engineers, owing to the daring intrepidity and able manœuvring of Lord Exmouth, were not required as miners on shore, but throughout the action fought at the guns with the seamen of the *Queen Charlotte* and *Impregnable*, and gained equal credit with the Navy and Marines for their conduct. Sub-Lieut. Calder and 15 rank and file were wounded.

At 4 p.m. one of the Algerine frigates was set on fire, and by 7 p.m. the town, arsenal, storehouses, and the vessels within the Mole were burning briskly. The Admiral in his despatch says:—

"About sunset I received a message from Rear-Admiral Milne conveying to me the severe loss the *Impregnable* was sustaining, having then 150 killed and wounded, and requesting I would, if possible, send him a frigate to divert some of the fire he was under.

"The *Glasgow*, near me, immediately weighed, but the wind had been driven away by the cannonade, and she was obliged to anchor again, having obtained rather a better position than before.

"I had at this time sent orders to the explosion vessel, under the charge of Lieut. Fleming and Mr. Parker, by Capt. Reid of the Engineers, to bring her into the Mole; but the Rear-Admiral having thought she would do him essential service if exploded under the battery in his front, I sent orders to this vessel to that effect, which were executed. I desired also the Rear-Admiral might be informed that many of the ships being now in flames and being certain of the destruction of the whole, I considered I had executed the most important part of my instructions, and should make every preparation for withdrawing the ships, and desired he would do so as soon as possible with his division."

Between 8 and 9 p.m. the explosion vessel was run on shore near the battery north of the lighthouse, and blew up soon after 9 o'clock with tremendous effect. About midnight after much warping and towing, by the help of a light air of wind the Admiral withdrew his ships out of reach of shells, and came to anchor about 2 a.m. on the 28th August after 12 hours' incessant labour.

The flotilla of gun, mortar, and rocket boats shared in the honours of the day and performed good service; it was by their fire that all the ships in the port were in flames, which extended rapidly over the whole arsenal. The Dutch frigates covered the British ships from the enemy's flanking batteries, on which Admiral van Capellen kept up a good fire. Altogether the British and Dutch ships fired 50,000 round shot and the casualties were 141 killed and 742 wounded.

The Dutch Admiral in his despatch says:—

"The destruction of nearly half Algiers, and at 8 o'clock in the evening the burning of the whole Algerine Navy have been the result of the

Digitized by Google

attack. Till 9 o'clock Lord Exmouth remained with the *Queen Charlotte* in the same position, in the hottest of the fire, thereby encouraging everyone not to give up the begun work until the whole was completed, and thus displayed such perseverance that all were animated with the same spirit, and the fire of the ships against that of a brave and desperate enemy appeared to redouble. Shortly afterwards the *Queen Charlotte*, by the loosening of a burning wreck, being in the greatest danger we were, under the heaviest fire, only anxious for the safety of our noble leader."

At daylight on the 28th the Admiral repeated his demands upon the Dey, which were then acceded to. Over 1,000 Christian slaves were freed; the abolition of Christian slavery was promised; due reparation was made to the British Consul and nearly £80,000 was recovered of ransoms paid.

Two accounts of the action by Engineer officers engaged have been preserved, one by Capt. Reid, who was on board the Admiral's ship, is addressed to Lieut.-Colonel Burgoyne and runs thus :—

"*Queen Charlotte*, OFF ALGIERS,
"*August 28th*, 1816.

"MY DEAR BURGOYNE,

"I have made a rough sketch of Algiers, sufficient to give you an idea of our attack, though not otherwise much to be depended on. I have not time to detail the action, which you will have in the despatch.

"This ship led and anchored head and stern within less than 120 yards from casemated batteries obliquely. It was the admiration of our fleet, and astonished our enemy, who were driven from them the first broadside. But the batteries farther from us were not so easily silenced, and wherever they could fire long shots they had the advantage. During the action the *Queen Charlotte* was veered round to different batteries as on a pivot, and when a large enemy's frigate on flames was coming on board of us, she veered away both cables, and hauled in a hawser and saved herself.

"Major Gosset, with an officer of the Navy, and one of the Marine Artillery, boarded the nearest frigate under a heavy fire (she was not manned), and set her on fire. I think it was our carcasses set fire to the others, and caused amongst our enemies a general conflagration.

"It was intended to have stormed the Mole opposite the *Queen Charlotte*, but it was the difficulty of communicating with us, and getting us off again that prevented Lord Exmouth's ordering it. The ships would soon have fired away all their ammunition (for we had thundered from 2 or 3 till 10 at night), and if the rigging had been totally ruined we ran the risk of being all taken.

"Audacity has a great effect in war, and here it has succeeded. Our Sappers were prepared with their arms, hand grenades, smoke balls, and rockets, to storm. We had 13 wounded at the guns. Neither rockets nor shells would set the town on fire. The most of the Algerine guns are very long. I saw as we dropped our anchors two men outside the casemate, one at each end of an immense sponge getting it into the gun. In case this should be the first you hear of us I should say that we gained a victory and made a peace. I have not time to say more."

Digitized by Google

The terms of peace were the abolition of Christian slavery for ever; the delivery to Lord Exmouth's flag of all slaves in the dominions of the Dey, to whatever nation they might belong, by noon of the next day; at the same time also to deliver all money received for the redemption of slaves since the beginning of the year; and an apology and reparation to the British Consul.

On the 1st September the Admiralty was informed that all the slaves in the city of Algiers and its neighbourhood were embarked and also 280,000 dollars had been handed over for Naples and Sardinia. The fleet left Algiers on the 3rd September and the Admiral was greatly gratified that he had not left a single Christian a prisoner in Algiers. Capt. Brisbane arrived at the Admiralty on the night of the 14th September with Lord Exmouth's despatches. The 7th Company, Royal Sappers & Miners, and the officers of Royal Engineers returned to England in the *Queen Charlotte* and the *Glasgow* frigate. As a reward for their services each soldier received a gratuity of two months' pay. Major Gosset was given a Brevet Lieut.-Colonelcy and again Capt. Reid, who had taken an active part in the engagement and had exposed himself to a heavy fire in an open boat in carrying out the Admiral's orders, was passed over.

On Reid's return home from the bombardment of Algiers he was given two months' leave of absence. He had greatly impressed Lord Exmouth with his ability and his coolness under fire, and, as had several times before happened with other commanders under whom he had served, had inspired his lordship with a personal attachment, which showed itself in the great concern he felt for the unjust treatment which Reid had received, and in his determination to do everything in his power to obtain some official recognition of his merits. He recommended him for promotion for his services at Algiers and wrote privately to the Master-General of the Ordnance, the Earl of Mulgrave, on the subject.

Reid's friends in the Corps were by no means inactive. Lieut.-Colonel C. Pasley, then head of the instructional school for the Corps and for the Royal Sappers and Miners at Chatham, wrote to Lord Exmouth, telling him exactly what the difficulties were that lay in the way of Reid's promotion. He pointed out that what was most wanted was that the powerful influence of his lordship and others should be brought to bear on the Master-General of the Ordnance to induce him, in spite of these difficulties, to recommend Reid for the promotion he had earned over and over again.

The Admiral wrote to Lieut.-Colonel Pasley in reply :—

Letter from Lord Exmouth to Lieut.-Colonel Pasley.

"JORDAN'S HOTEL, ST. JAMES'S STREET,

"*29th October*, 1816.

"MY DEAR SIR,

"I have received your very strong letter in favour of my friend Capt. Reid's claims to brevet rank for his late services under my flag at

Digitized by Google

Algiers. I was not aware that there were any rules which could operate so fatally to his interest as that you mention. I had written Lord Mulgrave upon it from Cheltenham, saying everything in my power in his favour, and I shall, I am sure, be as happy as Reid himself can be if my application is successful; for no person can have a higher esteem for him than I have. If I should have the good fortune to meet Lord M. next Thursday at Lord Bathurst's dinner I shall embrace the opportunity of entering upon the subject with him, and urge the sensible and strong arguments you have advanced for his being excepted from the general rule before it is established.

"I beg to return you my thanks for your information and for your civil expressions towards myself, and have the honour to be

"Dear Sir,

"Your very obliged and obedient servant,

"EXMOUTH."

The same day that the Admiral wrote the above letter Lieut.-Colonel Pasley had an interview with the Inspector-General of Fortifications on the subject of Reid's promotion, and next day wrote to Reid as follows :—

"LONDON, *the 30th October*, 1816.

"DEAR REID,

"I yesterday spoke to General Mann in your behalf. He was very ill, poor old fellow, so I was obliged to be rather more brief than I could have wished in order to spare him.

"He told me that he had fully as strong a sense of your merits, as I appeared to have (which I doubt), but that *he* could not do more than he had done. That he had already fully explained to Gosset, *you*, and some other person, the circumstances under which *he* himself had acted, and that the sole impediment to your promotion was Lord Mulgrave.

"I concluded by remarking, if *that* was the *case*, that Lord Mulgrave could not do an action that would render him more obnoxious to the Corps of Engineers, or to the Army, than to stop your promotion, but I supposed his lordship was proof against public opinion.

"I this morning received a very civil note from Lord Exmouth° in reply to my letter, that I wrote to him about you. I enclose it for your perusal. You will see that he appears to be as zealous in your cause as you could wish.

"Your very sincere friend,

"C. W. PASLEY."

On the 30th October Lord Exmouth wrote again to Capt. Reid, sending him a letter he had received from Lord Mulgrave dated 26th October, which had been sent to him at Cheltenham and had followed him to town. The letter from the Admiral and its enclosure are as follows :—

"JORDAN'S HOTEL, *30th October*, 1816.

"MY DEAR REID,

"The enclosed came to me this evening and sorry, very sorry am I to send it to you. If I dare do such a thing without permission I would send

° This is the letter of 29th October given above.

Digitized by Google

Lord Mulgrave the very sensible and well-argued letter which Lieut.-Colonel Pasley, a stranger, sent to me in your behalf wherein he does you most ample justice. I must not send it without Colonel Pasley's consent, but I have a great mind to send it to you that you may know how he values you, not however more than I do, I assure you. If I meet Lord Mulgrave to-morrow at Lord Bathurst's at dinner I will certainly speak to him upon it again, or I will send him any statement you please to make in refutation of his statement in which I would fain hope he is mistaken.

"Believe me, my dear Reid, ever your sincere and faithful servant and friend,

"EXMOUTH."

Letter from Lord Mulgrave to Lord Exmouth enclosed with preceding letter.

"MULGRAVE CASTLE, *October 26th*, 1816.

"MY DEAR LORD,

"I am fully sensible of the general merits of Capt. Reid, and know of no recommendation that would have more influence than yours in any measure which I should feel at liberty to adopt, but Capt. Reid has but seven 2nd captains under him in the Corps of Royal Engineers and has not yet served the two years in that rank which are necessary for promotion to the rank of field officer; there is however a still stronger (were he qualified to receive the brevet) which is that about 70 senior officers would be affected in their ultimate views of arriving at the command of a battalion by Capt. Reid receiving brevet rank, and I am persuaded your lordship will at once see that in so meritorious and distinguished a Corps many highly meritorious officers of eminent service must amongst that number be passed over. I am obliged therefore from consideration to the Corps at large, however desirous of attending to the services of Capt. Reid, and to your wishes in his favour, to decline recommending the brevet promotion of that meritorious officer. I trust this explanation will satisfy you and leave no doubt of my desire in all things possible to manifest the sincere respect and esteem and with which I am, my dear lord,

"Yours most sincerely,

"MULGRAVE."

All the efforts of Reid's friends to get him some reward in the shape of promotion for his war services proved unavailing. Want of precedent had stood in his way when he was a subaltern and prevented his promotion to Brevet Captain, which had been so strongly recommended by the commanders under whom he had served in the field, and now that he was a Regimental Captain another difficulty prevented him getting a Brevet Majority. Pressed, however, on all sides to do something for Reid Lord Mulgrave asked for a Companionship of the Bath for him, but this also was barred. On the 28th November Lord Mulgrave had to write to General Mann that he was not aware when he made the application that the order was not given to an officer under field rank, adding, "if you think the knowledge of an unsuccessful effort in his favour would

Digitized by Google

be satisfactory to Capt. Reid you can make such use of the enclosed letter as you think proper." The letter was as follows :—

"*November 25th*, 1816.

"DEAR MULGRAVE,

"According to the existing Regulations the 3rd Order cannot be conferred on Capt. Reid, but you will see Lieut.-Colonel Gosset's name inserted in the gazette for that honour to-morrow or Saturday.

"Yours very sincerely,

"BATHURST."

Reid also received the following letter from his cousin by marriage, Lieut.-Colonel Cornelius Mann, R.E., who was aide-de-camp to his father, the Inspector-General of Fortifications :—

"PALL MALL, *27th November*, 1816.

"MY DEAR REID,

"I cannot learn that any correspondence of yours to Lord Exmouth passed through the General*; but I find that two or three of your letters to his lordship were sent to us for the purpose of being forwarded direct under our franks. This was done by your desire as you did not know where to address him.

"I fear now by the last correspondence with the Master-General all prospect of success has entirely vanished, so completely have the Earl† and the General* closed the door by a determination on both sides not to give in. Nothing will or can make the General recommend while the obnoxious Regulation is considered to have effect.

"You must not take the General's meaning as a want of desire to serve you, I can assure you that he feels considerably distressed that you should be the sufferer; he has more than once expressed himself how happy it would make him to see your wishes fulfilled, and indeed I believe there is no one here, but what would be equally rejoiced.

"All your friends at Lewisham are in good health and desire their best regards.

"Ever faithfully yours,

"CORNELIUS MANN."

If envy had been in Reid's disposition he might well have envied Gosset's good fortune. For his services at Algiers, where he was the senior officer of Royal Engineers, Gosset not only had been promoted a Brevet Lieut.-Colonel, thus cutting away the main ground of the protest against Army rank carrying the commandantship, but he had also been created a Companion of the Bath. Envy was far from Reid, but he felt the insincerity of the argument advanced for denying him brevet rank, when it was conferred without demur upon another.

On the 4th December, 1816, Colonel (afterwards Sir) John Jones wrote to Reid the following letter, and it is strange that he does not

* General Mann, I.G.F.
† Earl of Mulgrave.

Digitized by Google

remark on the inconsistency of the position adopted by the authorities :—

"MY DEAR REID,

"I have taken different opportunities since the receipt of your letter to speak with everyone concerned respecting your promotion; and I am exceedingly sorry to add that I think it no further advanced than at your first application.

"The succession to the battalion is a stumbling block that can only be removed by some general decision on the subject.

"I hear such is now under consideration in consequence of Nepean's death; as J—— should succeed by regular rotation, and K—— by the senior brevet rank; as the latter has never been on service and obtained his promotion in a fencible corps in Newfoundland, the case is deemed favourable to make a stand against the Regulation, and General Mann is now doing so.

"This information is *entre nous*, but I have mentioned it, as if carried for the regular succession, your promotion will, I think, follow.

"Lord M. is, I believe, already shaken on the point.

"Believe me, etc.,

"JOHN T. JONES."

By this time Reid was beginning to lose patience and a sense of bitterness took possession of him for a time. He even went to the length of writing to the Master-General of the Ordnance asking permission to resign his commission in the Corps. His uncle, Lieut.-General William Fyers, C.R.E. in Ireland, heard of it and wrote the following letter, which is dated December only, but from internal evidence it must have been written, it is thought, at the beginning of the month :—

Letter from Lieut.-General William Fyers, R.E., to his nephew, Capt. William Reid, R.E.

"DUBLIN, *December*, 1816.

"MY DEAR WILLIAM,

o o o o o

"I had a letter from Colonel Mann lately which gave me much uneasiness on your account.

"He informed me that you had written to the Master-General of the Ordnance soliciting his leave to resign your commission in the Corps of Royal Engineers.

"I am sure I feel as much mortified as you yourself can be at your merit, services, and sufferings not meeting with the recompense which, I must own, you had a right to expect.

"They will not, you may be assured, be forgotten, and the reward will come in due time;—but it grieves me to see you displaying a spirit of resentment, which can only injure yourself.

"What your expectations may be from other quarters I do not know, but this I am sure of, that a commission in the Corps of Engineers, with

Digitized by Google

the rank and character you have attained in it, should not be surrendered on slight grounds. Nor is this 'kicking against the pricks' a wise course to pursue. I flatter myself, however, that the Earl of Mulgrave, who has always expressed himself favourably towards you, will show himself so much your friend as not to take you at your word. I am sure it would be a sad grief to your father and mother, as it would to me and all your friends and well-wishers.

"Pray remember me most kindly to Colonel Pasley.

o o o o o

"I have had a very tedious and rather uncomfortable journey round this island, but that I believe I mentioned to you before.

"I begin to be afraid from the delay that there is some hitch about filling up the vacant battalion.

"I remain, my dear William,
"Very affectionately yours,
"WILLIAM FYERS."

o o o o o

His uncle's good advice did not have much effect on Reid, who wrote in reply on the 6th December a wild sort of letter, in which he proposed all manner of ways of bringing his wrongs to notice. After all he was but 25 years of age and such a succession of disappointments after all his brilliant war service was enough to fill him with indignation and make him lash out rather freely in his letter to his uncle. Perhaps the General took him a little too seriously, but he administered a wigging, while, at the same time he gave him good advice, as the following letter shows:—

Letter from Lieut.-General William Fyers, R.E., to his nephew, Capt. William Reid, R.E.

"DUBLIN, 13*th December*, 1816.

"MY DEAR WILLIAM,

"I have just received your letter of the 6th, and lose not a moment in giving another dose of advice, as you profess to respect mine in the beginning of the letter though you seem to forget that profession before you conclude it. I can, you must be sensible, have no motive but your interest in giving you advice.

"In the first place, I think nothing can be more impolitic than pressing your suit in the manner you propose at the present moment.

"It happens fortunately that the battalion vacant by the death of General Nepean will bring the matter to a crisis, and I have reason to believe there will be some hesitation in bestowing it according to Army rank instead of rank in the Corps. . . .

"It does not follow that your brevet appointment coming somewhat later prevents its being antedated, so as at least to bring you on a par with those who are your contemporaries in rank and employed in the last expedition.

"You may depend upon it that your projected petition to the Prince Regent would do you more harm than good and I wonder your own good

Digitized by Google

sense does not suggest this to you, and that it would, as a matter of course, be referred to the Master-General of the Ordnance, who has, as yet, no reason to be your enemy, unless by a flippancy of conduct (I am persuaded not natural to you) you should make him so.

"Your idea of an appeal to the people is still more ridiculous and absurd. It might completely ruin your prospects of advancement.

"If you have any respect for my opinion and advice I now give it to you under a conviction that it is the wisest course for you to pursue.

"Abandon your scheme of petitioning the Prince Regent, and also that of an appeal to the Spa-fields mob. It makes me sick to think of it.

"Whatever representations you have to make make them to *General Mann* with that modesty and respect I know to be so natural to you, and which is the best foil to your merits and distinguished deserts.

"You may be sure that such representations will not be suppressed, or withheld, and that instead of weakening they will add great force to your claims and arguments.

"But, perhaps, at the present moment the wisest course will be to remain quiet and wait to see what will be done.

o o o o o

"I remain, my dear William,
"Your very affectionate uncle,
"WILLIAM FYERS."

On the very day that Reid wrote to his uncle the letter of the 6th December, 1816, which called down upon him the reproof and advice contained in the above letter of the 13th December, Reid had suffered a great and irremediable loss by the death of his father. The Rev. James Reid died at the age of 85 years at Kinglassie Manse, having been minister of the parish of Kinglassie in Fifeshire for 43 years, and of the parish of Lamington in Lanarkshire for eight years. He was buried on the 12th December in the churchyard of Kinglassie. In those days the post was slow and evidently General Fyers in Dublin had not heard of his brother-in-law's death when he wrote to Reid on the 13th. After the death of his father Reid's mother went to live at Kirkcaldy.

In February, 1817, having returned from Scotland, Reid consulted his friends before taking any rash step. No notice had been taken by the Master-General of the Ordnance of his application to be allowed to send in his papers. The result was that he followed the advice of his uncle and his friends and made a final appeal to the Master-General. What was probably of much more use to him was a letter he wrote to the Duke of Wellington, then commanding the Army of Occupation in France, which brought him back to the Duke's recollection; while his friend, Lord Exmouth, not only wrote at the same time to the Duke, but had a conference with Lord Mulgrave.

Lord Exmouth wrote to Reid on the 22nd February, 1817, "I have had my conversation with Lord M. and should like to see you, when convenient, to talk it over."

Digitized by Google

Reid's letters to Lord Mulgrave and to the Duke are as follows :—

To the Rt. Hon. the Earl of Mulgrave, Master-General of the Ordnance, etc., etc., etc.

"CHATHAM, 16*th February*, 1817.

"MY LORD,

"I beg to apologize after the many letters which have passed concerning my promotion, for troubling your lordship again with another.

"But I feel it due to myself, to all the captains of Engineers, and to all those who are yet to be captains, to ask (and I do it with profound respect) whether captains of Engineers are not to continue to look forward to the same rewards by brevet as captains in other corps.

"That such a Regulation would deeply affect the welfare of our Corps, I feel no doubt but that your lordship will be sensible of; and we may still trust that any officer showing sufficient merit will receive the reward due to him.

"I have been ambitious of meriting brevet promotion, and I flattered myself that by my good fortune and exertions I had gained it. For although I shall not presume to say that of all the captains of Engineers I am the fittest to be advanced in the service of my country (for we have men of first-rate talents amongst us); yet I will so far presume as to declare that I have been oftener engaged with the enemy than any captain of Engineers, either those who have received brevet rank, or who have not.

"If there should be any of the above number who can vie with me in point of applauses of commanders for general conduct while engaged, they have been much less engaged, and they are all Brevet Majors, or Lieut.-Colonels, with the order of merit, the 3rd Order of the Bath.

"I have been in thirty separate affairs with the enemy, among which are five general actions and seven sieges, besides Algiers. In the sieges I was employed in twelve assaults, the heads of three of which I guided; and by good fortune I was engaged in all the large sallies made in these sieges, and all these, although separate instances of being warmly engaged with the enemy, are not included in the thirty separate affairs before mentioned.

"I can add still more, my lord; that there are but two officers in the whole Corps of Engineers that have been more under fire than myself. These are Lieut.-Colonels Jones and Burgoyne.

"With such a claim as this, I think your lordship will excuse my numerous appeals; and I trust in your candour to forgive my entreating you again for brevet promotion.

"I have the honour to be, with the greatest respect,

"Your lordship's most obedient humble servant,

"WM. REID,

"*Captain, Royal Engineers.*"

The copy of the above letter kept by Reid has this docket: "Last letter on the Brevet Majority when forced to compare my services with others."

Digitized by Google

Letter from Capt. W. Reid, R.E., to the Duke of Wellington.

LONDON, *26th February*, 1817.

"MY LORD DUKE,

"I have the honour to enclose a copy of a very handsome letter,* which the Master-General of the Ordnance has done me the honour to write, by which Your Grace will see that he had recommended me for the Companionship of the Bath, but which I cannot receive, as I am not a Major.

"From recommendations which Lord Exmouth has been pleased to make on my behalf to promote me for my services at Algiers, the Earl of Mulgrave is desirous that I should obtain it, but as I did not command on that occasion, and as the services I have had the honour to perform under Your Grace have been so much greater (and though the other was brilliant), yet those under Your Grace were on such a different scale, he feels a diffidence in recommending my promotion without Your Grace's sanction and approbation.

"In stating my services to the Master-General of the Ordnance I have shown: that I have been oftener engaged with the enemy than any other captain of Engineers, not excepting any of the brevet majors or lieut.-colonels; and not the captains only but that I have been more under fire than any officer in the whole Corps of Engineers, excepting two—Lieut.-Colonels Burgoyne and Jones.

"Your Grace is also aware that although many attempts were made to obtain Brevet Captaincies for the late Lieut. Wright and myself by Sir Richard Fletcher, that rules in the Service prevented our promotion then.

"From these considerations and Your Grace's former honourable testimonials of my conduct before the enemy, as well as the consideration that a great part of the time I had the disadvantage of being a young subaltern in a large army, I think I may hope that Your Grace will not only approve of my being promoted, but that you will honour me with your support and recommendation.

"I have the honour to be with great respect,

"Your Grace's most obedient humble servant,

"WILLIAM REID,

"*Captain, Royal Engineers.*"

On the 13th March, 1817, Lord Exmouth wrote to Reid as follows:—

"MY DEAR REID,

"I send you a copy of the Duke's letter to me received this day. I have sent the original to Lord Mulgrave and do most sincerely hope your wishes will ultimately be crowned with success. Whatever may be the result I shall request to know it, for although our endeavours may fail for the present I shall never cease to embrace any occasion which presents for your attainment of an object so truly merited.

"Believe me ever most sincerely,

"Your attached servant,

"*13th March*, 1817." "EXMOUTH."

* This letter is not forthcoming.

Digitized by Google

Copy of a letter from the Duke of Wellington to Lord Exmouth.

"PARIS, *March 8th*, 1817.

"MY DEAR LORD,

"I received by this last post your lordship's letter of the 26th ult. and it has given me the greatest pleasure to have it in my power to join my recommendation to that of your lordship in favour of Capt. Reid of the Royal Engineers. I have written by this post in his favour to Lord Mulgrave in the strongest terms.

"Allow me to take this opportunity of congratulating your lordship upon the successful and honourable termination, under your command of the most arduous and brilliant operation and service that has occurred for many years. I assure your lordship that no person admired it more than I did, or was more sensible than I was, how much of its brilliant success was due to your lordship's combinations, and to your heroic conduct and example.

"I have the honour to be,

"My dear lord, ever your most obedient and faithful servant,

"WELLINGTON.

"ADMIRAL THE LORD EXMOUTH, G.C.B., etc."

Lord Mulgrave's reply to Lord Exmouth's letter enclosing the Duke of Wellington's, ran as follows :—

The Earl of Mulgrave to Lord Exmouth.

"HARLEY STREET, *Thursday Night.*

"MY DEAR LORD,

"At my return home I find your lordship's letter, and I lose no time in assuring you that my best exertions shall not be wanting to forward the promotion of Capt. Reid; indeed I have already made application to the Duke of York.

"I return the valuable letter of the Duke of Wellington, who, eminently qualified to judge of such achievements, is best able to express them in appropriate terms.

"It is no ordinary testimony of the merits of Capt. Reid to have excited the warm interest of two such commanders of his services. I beg leave to assure your lordship that I am with feelings of the highest respect and regard

"Your lordship's most faithful and obedient

"MULGRAVE."

Unfortunately the Duke's letter cannot be traced. It would have been interesting to know precisely how Reid stood in the eyes of the great commander and in what words of commendation the recommendation was made.

Whatever the reason may have been, it is clear that Lord Mulgrave was now more than "shaken on the point," as Colonel J. T. Jones had expressed it. In fact, as Colonel Pasley had suggested, the application of powerful influence had completely broken Lord Mulgrave's adherence to the views he had formed, and to which he had so pertinaciously held.

Digitized by Google

His application to H.R.H. the Duke of York, Commander-in-Chief, for Reid's brevet, coming from the Master-General of the Ordnance and backed by the support of the Duke of Wellington and of Lord Exmouth secured immediate attention and the brevet was sanctioned.

The Secretary of the Board of Ordnance wrote the following letter to the Inspector-General of Fortifications to inform him :—

From Lieut.-Colonel (afterwards Lieut.-General Sir) Stephen Remnant Chapman (C.B., K.C.H.), R.E., Secretary to the Master-General of the Ordnance, to Lieut.-General Gother Mann, Inspector-General of Fortifications.

"OFFICE OF ORDNANCE, *26th March*, 1817.

"SIR,

"I am directed by the Master-General to acquaint you that His Royal Highness the Prince Regent has been pleased to confer the Brevet rank of Major in the Army on 2nd Capt. William Reid of the Royal Engineers, on account of the representation which has been forwarded by his lordship of the gallant and distinguished conduct of that officer in several instances while on service.

"I have, etc.,

"S. R. CHAPMAN."

It must be confessed that the letter is not worded enthusiastically. It seems to have been dragged unwillingly from the Commander-in-Chief. "Gallant and distinguished conduct of that officer (Capt. Reid) in *several instances* while on service" is a meagre and inadequate statement, to say the least, considering the extraordinary number of instances in which Reid had displayed gallantry and distinguished himself on service. But Reid had won the recognition he had wanted and was not only content but very grateful to all who had assisted him to obtain it. The promotion was dated 20th March, 1817.

The date on which Reid's promotion for gallant service in the field was first recommended was, it will be remembered, as far back as the 17th May, 1811, when Capt. John Squire wrote strongly in his favour from Elvas for his gallantry at the first Siege of Badajos, and the Commanding Royal Engineer, Colonel Richard Fletcher, forwarded a copy of a most honourable testimonial of Reid's conduct on that occasion to the Inspector-General for Fortifications. During the six years which had passed since that date he had added year by year to his claims for reward, and had been repeatedly recommended for it by the various distinguished commanders under whom he had served. This brevet majority was the first and only reward received by Reid for services in the Peninsula, at New Orleans, in the Netherlands, at the Capture of Paris, and at the Bombardment of Algiers. It would not have been more than a due recognition of these claims to have given him a second brevet and a C.B. But in those days rewards were for the favoured few, and his brevet majority remained for many years the only recognition of his merits.

Digitized by Google

DEPRECIATION.

A Paper read by MAJOR W. A. J. O'MEARA, C.M.G., *before the Institution of Post Office Electrical Engineers on April 4th,* 1910.

EVERY sound commercial undertaking presents to those responsible for its management one main problem, and that is, how best to provide an excess of revenue over expenditure, sufficient in amount to ensure the stability of the undertaking as a "going" concern. Naturally, the considerations which affect the solution of the problem differ very widely in different classes of undertakings, and according to the nature of the enterprise which is involved.

It is not my purpose, however, to deal with these considerations generally, but with one element only which affects this problem. I shall further endeavour to confine my remarks more particularly to those aspects of this element which apply to the telephone business. The element which I propose to deal with is that of depreciation, a subject which by itself requires the study of almost a lifetime, and forms a factor of most profound importance in every undertaking which depends largely for its existence on the employment of machinery or plant.

DEFINITION.

Depreciation has been defined as a "lessening in value from age and contributory causes," and it may be said to be, that deterioration or fall in value of physical property which is not made good by current repairs. It is evident that if impairment of the services rendered by the use of any machinery or plant subject to decay or deterioration is to be avoided, measures must be adopted for the replacement of the same, bodily, before it reaches that state of decrepitude which would result in a total or partial cessation of these services.

ASPECTS.

Depreciation can well be considered as having two aspects, namely, the Engineering aspect and the Accounting aspect; these two aspects, however, are intimately associated, since the provision made under the second named is determined almost wholly by considerations arising out of the first named.

Digitized by Google

I have to confess that I have found it by no means an easy matter to prepare this paper. The fact is that no two authorities on the subject appear to have included the same factors in the term "depreciation," and further there is no accepted standard method of dealing, from the accounting view, with the funds which should be set aside to pay for replacements of plant, etc., as they become due. For convenience I propose to deal separately with the engineering and accounting aspects of the question.

ENGINEERING ASPECT.

The principal considerations affecting the question of replacement of machinery and plant, and the buildings in which they are housed, are as follows :—

i. Physical decay.
ii. Obsolescence, sometimes called antiquation.
iii. Inadequacy.
iv. Tenure of holding.
v. Reconstruction requirements imposed by legislation.
vi. Unforeseen expenditure arising from accidents or other emergency.

The enumeration of these factors which are involved in the determination of the "life" which shall be assigned to physical property of various kinds, in order that proper provision may be made in the accounts of an undertaking to meet the charges in respect of depreciation, demonstrates, to some extent, the great complexity of the problem presented to the engineer who has to prepare estimates dealing with this important subject.

PHYSICAL DECAY.

It is well known that buildings, machinery, and plant, however well they may be constructed and cared for, gradually deteriorate so that ultimately they must be replaced, hence the necessity for providing against depreciation has been universally admitted so far as it concerns the factor of physical decay, and at one time this deterioration was thought to be the only item which had to be taken into consideration in assessing the "life" of machinery, etc. It would, at first sight, appear that little difficulty need be experienced in making the necessary allowance to provide for this item, but if it is agreed that the basis on which the "life" of such a class of property is estimated must have a surer foundation than that of the mere expression of an individual opinion, then it will be no easy matter to frame suitable estimates to provide for depreciation.

Digitized by Google

To make the matter somewhat clearer, let us consider a few of the factors which will enter into the engineer's calculations in connection with depreciation on some of the classes of property necessary for the conduct of a telephone enterprise.

Probably it will not surprise you if I commence by mentioning land. On the completion of a development, study the acquisition of a site, for the central station equipment is the first matter which has to be considered. The members of this institution are well aware that it is necessary to establish telephone exchange buildings as near as possible to a certain theoretical centre, and unfortunately, however careful may have been the study on which the fundamental plan was based, it is known that telephone business is apt to develop in an erratic manner in some localities. When this is the case, the exchange building is no longer situated in the position which is most economical from the point of view of the provision of external plant, and in consequence the land value deteriorates, not only because the location of a site has not always the same economic aspects in other undertakings as in a telephone enterprise, but also since the buildings thereon may have to be removed at considerable cost to render the site free for the undertaking which it is proposed shall replace the telephone exchange. Land is liable to further deterioration from causes apart from the character of the business carried thereon. The nature of the subsoil may be treacherous, and subject to subsidence owing to mining or other causes; these factors may involve enormous unproductive expenditure in connection with foundations and other subterranean works. The deterioration in such cases can, I think, often be quite logically regarded as in the nature of physical decay of the land.

A reference to the conditions affecting depreciation upon buildings seems to follow appropriately here. My last remarks indicate, I think, that the character of the land on which buildings are erected is a factor which in some cases may have considerable influence in the estimation of their "life." This land may be freehold or leasehold. The nature of the servitudes, if any, on the site, and the duration of the lease and the terms under which it is held, are naturally factors which will play a determining part in the Engineer's calculations. Further, the character of a building is an important factor in fixing its prospective "life." Little expert knowledge is required to decide whether a building having a substantial foundation laid in concrete, a skeleton framework of steel, and stone casing, will outlast a jerry-built brick structure. Again, the durability of each class of buildings will depend largely on the character of the periodical repairs which may be carried out.

What I have said in respect of the effect in the value of land owing to the shifting of the economic centre applies equally to the value of telephone buildings. However, in both cases, in certain

Digitized by Google

circumstances, instead of a lessening in the value, an actual appreciation in value may accrue to both the site and the building. The appreciation may arise from a natural increase in land values, or it may be brought about by the erection of high-class buildings in the immediate vicinity of the property in question. There are other more remote causes which sometimes affect land values.

The causes affecting the full "life" period of plant and machinery are more numerous than in the case of buildings. There is the inevitable wear and tear resulting from the operation of the plant or machine; further, negligence and incompetence naturally accelerate the rate at which deterioration takes place. For instance, the "life" of accumulators is largely dependent on the care which is exercised in charging and discharging them. In other classes of plant, under the expression "wear and tear" have to be included not only the destructive forces which come into play owing to the actual user, but also those external forces which contribute to the destruction of certain classes of property. Take the cases of subterranean and aerial cables: the principal causes of deterioration which affect their "life" are:—

1. Mechanical injury.
2. Chemical decomposition.
3. Electrolysis.
4. Vibration.
5. Lightning.
6. Attack by insect—*e.g.* by the cable bug whose appearance in Australia, California and southern portion of the United States has been notified.

Similarly, poles are liable to:—

1. Mechanical injury.
2. Attack by fungus growths.
3. Destruction by woodpeckers and insects.

In both these cases, clearly the external forces are more potent than those arising from the "duty" imposed by the user of the plant; that is, the factors usually referred to as wear and tear.

I think it is unnecessary to refer to any other parts of a telephone system, for illustrations of the causes which so largely determine the "life" of the various classes of physical property necessary for the conduct of a telephone enterprise, more particularly as the "life" of the only other items of real importance, depends on considerations which play a more influential part than wear and tear and which will be dealt with later. Those items are the Central Office equipment and apparatus.

Digitized by Google

The most correct estimates of the average "life" of the various classes of plant involved in any undertaking can best be secured by means of statistics. Depreciation is to some extent dependent upon the character of the day-to-day maintenance which has been provided, but it should not be forgotten that local conditions also play an important part. The chief requirement in order that an engineer may be properly assisted in this matter clearly consists in the preparation of a carefully compiled record in which the various descriptions of machinery and plant are properly classified. Such a record should show the causes for which any machinery, plant, etc., have been put out of service, the period during which they were in use, and a statement of local conditions likely to have affected their life.

I think I have now said sufficient on the "age" aspect of depreciation, and will turn my attention to the "contributory causes" of depreciation.

Obsolescence.

The first of these causes, namely obsolescence or antiquation, is a factor of much moment in an undertaking such as the telephone enterprise, particularly in the present stage of its development when the art is rapidly changing owing to the progress of invention.

The substitution of new and up-to-date machinery and appliances for old plant cannot always take place, but only at such times as the management of a concern can justify the change owing to the economies which it is hoped to effect by the abandonment of old plant in favour of newer designs. Another influence prevails. It must be remembered that the public nowadays soon learns that much more convenient service may be afforded by some new invention, and at once commences to clamour for its introduction. Few administrations can withstand the pressure of the public when the convenience of the latter is seriously affected, and the result is that often before the natural "life" of old plant is exhausted, the newer design has to be substituted. During my stay in America, I learnt that frequently it was due to such pressure alone that common battery systems had replaced magneto installations. We have not reached finality in the design of switch equipments; auto-manual and automatic equipments are on the market, and must be taken into consideration in estimating the "life" of telephone apparatus.

Inadequacy.

The item affecting depreciation which is most difficult to cover by an estimate is that of inadequacy; it is largely governed by the original fundamental plan or lay-out, which in its turn is dependent on the development study. In the case of a telephone undertaking,

Digitized by Google

not only the rate of growth of the subscribers, but also their distribution may have been inaccurately predicted. It has already been stated that one effect of this is the disturbance of the economic centre; unfortunately, the mischief does not end here, but other results may be that the switchboard equipment is housed in buildings which cannot provide for efficient development at the higher rate demanded by the public requirements. It may also become necessary to replace overhead distribution immediately by means of an underground system, owing to insufficient carrying capacity having been provided in the original pole lines, and in some cases cables may have to be withdrawn within a few months of being laid to be replaced by others containing larger numbers of conductors. Electric lighting undertakings suffer from the same difficulty in connection with the design of their distribution system. The Post Office engineer is unfortunately also liable to the same errors as prophets in other fields.

TENURE OF HOLDING.

Tenure of holding may affect any class of telephone plant. It is quite a common practice to instal switchboards in a rented building; in such cases it is the term of the lease, and not the character of the equipment which may determine the "life" of this plant. Further, it is unfortunately necessary at times to place external plant, both underground and open, on private property under a wayleave agreement containing a removal clause; and here again the plant may have to be disturbed, with consequent loss, before the expiration of its natural or even useful "life." If the cases of removal due to these causes are carefully recorded it will not be difficult to make a fairly satisfactory allowance for such disturbance in estimating depreciation.

RECONSTRUCTION REQUIREMENTS IMPOSED BY LEGISLATION.

It sometimes happens that reconstruction of plant has to be carried out by its owners owing to the exercise of statutory powers conferred on public authorities and corporations.

I have in mind such cases as the disturbance of pole and pipe lines by the widening and regrading of streets by city authorities, and by the widening of railways, reconstruction of sidings and stations, etc.

In such cases the disability under which public companies often have to operate is also felt by a State department. Cases are not unknown in which the Post Office has been called upon to pay for the reconstruction of its telegraph and telephone lines, in connection not only with alterations to streets, but also in connection with the widening of railways.

The burden thrown on the Post Office by the alterations to railway works has been particularly heavy. In one case in which a very

Digitized by Google

considerable mileage of wire was affected, the payments in respect of the reconstruction of telegraph lines involved amounted to 50 per cent. of the capital value of the plant disturbed, after making due allowance for value of recovered stores.

Unforeseen Expenditure Arising from Accidents or other Emergency.

I now come to the last of the factors mentioned as requiring consideration in connection with the replacement of machinery and plant, namely unforeseen expenditure arising from accident or other emergency. I am inclined to agree with those engineers who hold the view that any replacements on a considerable scale, rendered necessary in such circumstances, should really be provided for by means of an insurance fund or by payments of annual premiums to an insurance company. Annual sums set aside for this purpose would of course form a part of the working costs and they should be debited as headquarter charges. Consequently this item need not be included in the appraisal of "lives" of machinery and plant.

Estimates of "Lives" of Machinery and Plant.

The foregoing cursory investigation of some of the details of the factors which determine the useful "lives" of machinery and plant, etc., seems to indicate that if estimates relating to depreciation are to be tolerably reliable, it is desirable that the machinery or plant shall be scheduled under a sufficient number of distinct classes. Such classification will enable the engineer to give proper consideration to the effect which each of the first five factors mentioned by me as influencing depreciation will probably have on the peculiarities of each type of machinery, plant, etc.; for admittedly all the factors mentioned do not affect every type of machinery or plant in the same degree. As an illustration it is necessary to mention a single factor, only, namely, obsolescence. Little experience is necessary to tell us that in the past the internal plant of a telephone system has been affected by this factor to a far greater extent than the external plant, and that this condition of affairs is likely to continue.

In an undertaking which has been in existence for a considerable number of years and which comprises fairly large quantities of plant of the various descriptions required for its conduct, carefully kept records relating to such plant will afford a secure starting point for the appraisal of the "lives" of various classes of machinery and apparatus employed in the undertaking under consideration, and they will give fairly accurate information concerning the average "lives" of certain classes of plant, the replacement of the greater proportion of which has arisen so ly on account of physical decay. Such

Digitized by Google

"lives" may be considered to be the maxima for these classes. In order to estimate the useful commercial "life" it becomes necessary to make deductions from the foregoing maxima in respect of those factors which particularly affect the depreciation of any class of plant. The approximation of the deductions to the true value will depend not only on the extent and quality of the experience of the engineer responsible for the estimate, but on the possession by him of early and accurate information of the nature of the progress inventors are making in the design of new plant, and of a correct appreciation of the real importance of the improvements foreshadowed. Some persons appear to have a highly developed intuitive faculty for prognosticating coming events, and, in view of the problems which will fall to the lot of the engineer, it seems desirable that members of our profession should be well endowed with the quality for accuracy in prediction, that is with a prophetic insight.

I have prepared a table (Appendix I.) showing the estimated years of life which have been assigned to certain classes of plant. It is hardly necessary for me to state that the inclusion of the table in this paper is in no way to be considered as an acceptance on my part of the accuracy of any of these estimates. The statement of "lives" is placed before you rather with the object of showing that engineers are not entirely in agreement regarding this important matter. It may reasonably be asked, how the disagreement of experienced engineers on this question is accounted for. It is possible that an explanation for the divergence of views may be found in some or all of the following considerations :—

1. Engineers do not yet work to standard specifications; for example, tin is not contained in the lead covering of all aerial cables; again, in some cases petroleum jelly is employed as a lubricant when lead-covered cables are being drawn into ducts, and in other cases no lubricant is used. I need not enlarge on this point, as the other classes of plant in which differences in actual character are to be found will readily occur to you. The variations in the specifications relating to the two examples mentioned above no doubt appear small, but they prove to be important factors in actual practice. The absence of tin or the addition of 3 per cent. of this metal in the lead sheathing of an aerial cable really determines whether the "life" of the cable will be a comparatively short one or long one.

In the case of underground cables, the use of petroleum jelly has actually proved to be a protective agent against chemical attack, and in consequence cables treated with this substance have a longer average "life" than those which are not so treated. Each engineer naturally relies on his own experience and records for his estimates, and the foregoing statements disclose grounds for different "life" values being assigned to classes of plants which though generally considered similar are really dissimilar.

Digitized by Google

2. Since machinery and plant of similar types are not generally exactly similar in all respects, it follows that the character of the day-to-day maintenance in connection with their operation also varies. This appears to be particularly the case in connection with telephone enterprises.

3. In determining "lives" the same factors (*i.e.* obsolescence, inadequacy, etc.) are not always included, nor are the same values attached to those factors which have been included in the calculations.

4. Not only do views vary on the policy to be adopted in discarding obsolescent plant, which is largely a question of the temperament of the responsible officials, but as already stated, the extent of knowledge regarding improvements in progress and the experience and judgment of different engineers naturally vary considerably, and hence the personal equation of the responsible engineer has considerable influence on the completed estimate.

Depreciation which covers the total annual loss on the plant is sometimes divided by engineers, (as shown in Appendix I.) under two heads which may be termed "ordinary depreciation" and "extra-ordinary depreciation." The former term takes into account the life of the plant due to age and to advances of the art, and the latter expression covers wastage due to the necessity for reconstruction brought about by legislation.

I cannot leave the engineering aspect of this subject without a reference to "scrap" values. The price, obtained from the sale of machinery or plant when put out of service, is of course available to pay some part of the cost of replacement. In consequence, it is customary to estimate the probable value that machinery and plant will have at the end of their useful commercial "life," in order that the sums set aside for replacement may be suitably reduced in amount so as to provide as nearly as possible the actual cost of the replacement. The prices, obtained for old material at sales held over a considerable period, will, in the case of the majority of plant in use, readily enable an engineer to arrive approximately at the average percentage values on cost price which should be allowed for the various classes of "scrap."

Accounting Aspect.

When the engineer has settled the basis on which the proper allowances for depreciation can be provided in the most effective manner, the first question which has to be considered is the method by which the determined amount for depreciation shall be made available when renewals become necessary. This is almost entirely an accounting matter.

It may be well to explain that accountants usually apply the term "depreciation," to represent "the amount which has to be charged against the Profit and Loss account in respect of any class of wasting

Digitized by Google

or perishable assets, before the real profit from an accountancy point of view is arrived at." The items which have hitherto been referred to as buildings, machinery and plant, are known amongst professional accountants as "wasting assets."

But the expression "wasting or perishable assets" covers much more than physical property, the expression includes also intangible property, for example, "goodwill." Intangible properties like physical properties are subject to depreciation, as the exhaustion of the field of development, or the termination of an enterprise may extinguish their values as assets in a commercial undertaking.

The time at my disposal will not allow me to deal with the subject of depreciation from the enlarged point of view of a board of directors, moreover, it might lead me into fields which are far more controversial than those which I have already traversed. It is well to remember that some persons hold that there is an unexplored region of human faculty transcending the normal limitations of sensible knowledge. This being admitted, it is possible to contemplate the discovery of some means for the fertilization of these unexplored regions of the human faculty, and further, that by their intensive cultivation, the powers of telepathy may eventually become so highly developed and universal as to enable the human race to manage its affairs without the aid of telephone systems.

I am sure that you will agree that notwithstanding the advantages which this idea, if materialized, would bring, it is natural that we should regard at least one of its consequences with some misapprehension. I allude to the disappearance of our occupation—a contemplation which would give an undesirable countenance to the subject which I have in hand. I therefore dismiss it at once.

The law relating to the responsibility of directors of a limited liability concern is very strict. The management has to keep proper control over the plant employed in the business and to maintain it in working order; in consequence, a legal obligation is implied that sums shall be set aside to replace unserviceable plant, and that records relating to such provision shall be available for the information of the shareholders; nevertheless, no standard method of dealing with depreciation in the accounts of a public company appears to have been evolved.

The members of this institution are doubtless aware that the capital expenditure in connection with many public utility services undertaken by local authorities in the United Kingdom, is raised by means of loans authorized by the Local Government Board, and that in such cases it is expressly provided that these loans shall be repaid within stated periods. In the case of electricity supply undertakings, the practice has been to allow a period of 25 years for the repayment of the loans; this period being supposed to represent the average "life" of the various sets of machinery, plant and buildings upon which the

Digitized by Google

capital expenditure is incurred. These repayments are secured by the creation of sinking funds.

In the case of a long-established railway corporation owning hundreds of miles of track and large quantities of rolling stock, depreciation is cared for year by year by the replacement annually of a suitable number of locomotives, wagons, etc., and also by the renewal annually of portions of the permanent way, storehouses, station buildings, etc.

In the past, the Post Office has in respect of the renewal of the telegraph and telephone systems, practically followed a plan very similar to that adopted by railway companies; the sums expended for this purpose, however, were formerly merged with the account for day-to-day maintenance, but in recent times a special subhead of the Vote has been introduced to which renewal expenditure is charged.

Further, in connection with the Post Office telephone business, the Postmaster-General renders a financial statement in order to indicate the commercial results obtained. On examination of this statement, it will be observed that amounts expended in respect of depreciation are separately recorded.

In addition to the methods for dealing with depreciation mentioned above, others are also to be found. In fact Professor Dicksee has mentioned that he himself has found six methods in vogue for writing off depreciation, namely :—

1. Charging each year with the actual cost of repairs and small renewals and an equal fraction of the original cost of the asset.

2. Charging each year with repairs and small renewals, and with a percentage for depreciation calculated at such a rate as to reduce it to its then realizable value by the time it becomes useless for revenue-earning purposes.

3. By estimating in advance the total sum chargeable against revenue for repairs, partial renewals and original cost and charging each year an equal portion of it.

4. By charging revenue with such sum as will, at the expiration of the life of the asset, write off the original cost thereof, plus interest on the capital from time to time invested therein.

5. By charging revenue each year with actual or average expenditure upon repairs and small renewals, and with such further sum set aside and invested at compound interest as will accumulate to the original cost of the asset at the expiration of its estimated life.

6. Charging revenue with the difference between the book value of the asset and its actual value at the present time as estimated by an expert valuer.

The results which would be obtained by tabulating the anticipated expenditure in repairs and renewals under each of the above methods, in respect of a machine of which the original cost and the estimated

Digitized by Google

life are assumed to be £1,000 and five years respectively, are given in Appendix II.

It will be observed that no allowance has been made for the "scrap" value of the machine in these calculations, and that current repairs have been charged to the depreciation account, and in these respects the methods given do not agree with the practice adopted by the authorities quoted earlier in the address—in fact maintenance appears to have been confused with depreciation.

The conditions affecting various classes of undertakings differ so widely, that it certainly cannot be asserted that any one of the methods for dealing with depreciation is the best. It is sometimes the case that during periods of depression the temptation to divert sums which should be provided for depreciation to other purposes is very strong, and in consequence the method adopted should be one in which the risks arising from the starving of the depreciation reserve are not likely to affect the commercial soundness of the undertaking. The really important matter is not the scientific correctness of the records in the company's account books, but the necessity of having cash available at the moment it is required to pay for replacements which may have become necessary. This requirement points to the necessity of forming a "depreciation reserve," and renders it undesirable to employ funds set aside for this purpose in the undertaking itself; rather is it desirable that such funds should be invested in easily realizable securities.

It will doubtless occur to most that in those cases in which services have to be provided under contracts for stated periods, there is some advantage in making provision for depreciation on a basis which involves equal annual payments as the rates to be charged, which are naturally a function of the annual expenditure incurred in providing the service can thus be readily calculated. Methods 1 and 5 given in Appendix II. are both equally satisfactory from this point of view, and in consequence are eminently suitable for adoption in connection with telephone undertakings and similar enterprises.

Before leaving the accounting aspect of the subject, it may be well to draw attention to the fact that so far as it relates to the statements of accounts, depreciation affects both capital and revenue, since depreciation gradually reduces the value of wasting assets, and the revenue or the profit and loss account has to provide the amounts by which the wasting assets are written down in value. From what has already been said on the subject of replacements, it is evident that cases must occur in which the plant retired from service has a capital value which differs from that of the plant which replaces it. This necessitates the adoption of measures for adjusting the Capital Account. One method proposed for bringing about such adjustments consists in the establishment of three separate accounts under the designations of "plant account," "depreciation reserve," and "plant deductions."

Digitized by Google

The manner in which transactions would affect such accounts is perhaps sufficiently indicated in Appendix III.

The object of the various methods of calculating depreciation, is to represent the real value of the material part of machinery and plant by means of records in accounts, instead of by a process of revaluation by an expert.

It has been asserted that greater accuracy in determining the value of "wasting assets" would be obtained by periodic valuations, and writing off such loss as these valuations show than by a mere process of book-keeping. The principle of such periodical valuations has been accepted in America and also to some extent in this country, and there certainly appear to be some advantages in adopting this method of treatment. One of these advantages, but not the least, is that a useful check is established for comparing the actual with the estimated depreciation in any case.

When such valuations are part of a system, and are carried out by independent experts at regularly recurring intervals, another of the advantages is that opportunities will be afforded to adjust the provisions made for depreciation, in those cases in which insufficient allowance may have been made for the influence of some of the more variable factors which affect the situation.

Conclusion.

I come now to my final remarks.

It is generally accepted that often it is on the rate provided for depreciation alone, that the fortunes of an undertaking may turn in deciding whether a profit or loss is being made at every period of its existence. The duty of the engineer is concerned not only with the design of works alone, but also with their operation and commercial value, and, therefore, his advice will often decide the fortunes of an engineering enterprise.

In every important phase in the development and progress of such enterprises the engineer is faced with the problem of depreciation; he is further much concerned with the exact method of providing for depreciation. If a wrong choice is made money is absolutely wasted.

The problem confronts him from the earliest days of the inception of an engineering project, and matures when competitive tenders for the work first come under consideration. We know that it is not the capital cost alone which determines whether one scheme is more advantageous than another; a comparison of total annual costs in respect of the tenders received, is necessary to enable an engineer to decide which scheme is the more profitable one to adopt, but annual costs are made up of interest on capital, of depreciation and of operative or running costs. As regards any particular tender, the interest on capital and the operative costs are together a constant

Digitized by Google

quantity. The method of allowing for depreciation may however vary, and it will therefore be seen that according as Method 1, Method 5 or some other method shown in Appendix II. is adopted to complete the figures for the comparison of tenders in respect of two alternative schemes, the annual balance may turn in favour of one tender or another. The engineer is not always in a position to dismiss the question of depreciation from his thoughts, when it has been finally decided that some particular tender for plant or machinery required for his purpose is the most advantageous one, and when in consequence that tender has been accepted. It has already been stated that allowance will have been made in engineers' calculations for obsolescence. In many cases his anticipations in respect of this factor will be realized, for the inventor is sure to come to his assistance with improvements and claims. In practice, however, it will often be difficult to decide exactly at what date it will be justifiable to replace plant doing effective service, by some new invention which may have been "proved in" as eminently satisfactory on being "tested out." In such cases the engineer has to compare a situation in which he has fairly complete knowledge of the value of the various technical and financial factors requiring consideration, with one in which he cannot with the same certainty attach reliable values to the important elements coming into play in connection with the invention, and, further, the value of apparently efficient plant or machinery to be scrapped is sure to attract considerable attention, and in such cases the charge against the depreciation account will indeed loom large. A bold and courageous policy has often proved advantageous in the past in connection with the handling of obsolescent plant, and it is certain to do so again in the future.

In considering the very important question of turning out good plant in favour of new designs of machinery alleged to be more economical, the problem resolves itself into a consideration of the question whether the difference in annual costs likely to be incurred in respect of the new machinery, and the actual annual costs incurred in respect of the existing plant, is sufficiently great to pay for the "wastage" or value of the unexpired useful life of such parts, and of the cost of removing such of it as may be "scrapped." For instance, in the example given in Appendix III. the loss shown under plant deductions will have to be extinguished within a reasonable time after its replacement. In such cases, also, depreciation and the method by which it is provided may clearly be the ruling factors in the commercial situation.

The considerations affecting the aspects of depreciation just referred to are very familiar to the members of this institution. There is still another aspect of the case, which, although of not such frequent occurrence is of immense importance, and that is the aspect in

Digitized by Google

connection with the valuation of the property of a "going" concern for the purposes of a purchase. The question of the allowance to be made for depreciation becomes in these cases perhaps more controversial than in any other situation. The engineer advising the purchasing party has a double duty to perform. He has to protect his own client and at the same time he has always before him the responsibility of being just to the selling party.

The engineering problems relating to a proposal to purchase a "going" concern, for all practical purposes involve considerations similar to those connected with alternative tenders, for it is simply a case of considering annual costs in respect of the "going" concern, as compared with such costs in respect of the new plant which would do the same work as well, if not better.

The subject of depreciation is of vital importance to shareholders of public undertakings, and it is certainly of no less importance to the public generally, who are to some extent involuntary shareholders in the undertaking which absorbs our energies.

A public utility service managed by a State department must be not only the best of its kind, but the charges made for it must be reasonable and such as not to involve a burden on the ordinary tax-payer. Thus we see that ultimately depreciation finds its way into the rate charged for our telephone service, and must react on the same with every change in engineering policy.

Since writing this paper my attention has been drawn to an interesting pamphlet entitled "Introductory Notes on Leake's Register of Industrial Plant." Mr. Leake is a great authority on depreciation and I can thoroughly recommend not only a study of his introductory notes, but also the perusal of the papers on depreciation which he read before the Institute of Directors in March, 1907.

Digitized by Google

APPENDIX I.

TABLE SHOWING DEPRECIATION OF PLANT CONNECTED WITH A LOCAL TELEPHONE SYSTEM AS ASSESSED BY VARIOUS AMERICAN AUTHORITIES.

Property.	*Engineer, Manufacturers Telephone Co.					*Engineers, Chicago Telephone Co.					*Chicago Telephone Commission.					Another American Authority.				
	Further Description of Property.	Depreciation.				Further Description of Property.	Depreciation.				Further Description of Property.	Depreciation.				Further Description of Property.	Depreciation.			
		Life in Years.	Per Cent. †No Interest.	Scrap Value.	Per Cent. to ‡Reconstruction.		Life in Years.	Per Cent. †No Interest.	Scrap Value.	Per Cent. to ‡Reconstruction.		Life in Years.	Per Cent. †No Interest.	Scrap Value.	Per Cent. to ‡Reconstruction.		Life in Years.	Per Cent. †No Interest.	Scrap Value.	Per Cent. to ‡Reconstruction.
Conduits	All Types	50	2	—		Main	33	3·3	0	1	Main	50	2·0	0	1½	Main	50	2·0	0	
	—	—	—	—		Subsidiary	14	7·1	0	2	Subsidiary	20	5·0	0	2	Subsidiary	15	6·7	0	
Underground Cables ...	All Types	20	5	—		Main	16½	3·5	42	2	Main	20	3·0	40	2	Main	20	3·0	40	
	—	—	—	—		Subsidiary	12	4·8	42	2	Subsidiary	15	4·0	40	2	Subsidiary	13	4·6	40	
Aerial Cables	All Types	20	5	—		—	11	6·0	34	3	—	15	4·0	40	3	—	12	5 8	30	
Poles, including Cross Arms	—	20	5	—		—	8½	11·8	0	6	—	10	10·0	0	4½	—	10	10·0	0	
Aerial Wire, Copper ...	—	—	—	—		—	15	2·0	70	5	—	15	2·0	70	3	—	12	5·0	40	
,, ,, Iron ...	—	6²⁄₃	15	—	3⅓	—	—	—	—	—	—	—	—	—	—	—	8	12·5	0	
,, ,, Drop Wires	—	—	—	—		—	7½	11·7	12½	10	—	8	10·6	15	4	—	10	9·0	10	
Aerial Terminals ...	—	—	—	—		—	12½	8·0	0	8	—	12	8·3	0	3	—	10	10·0	0	
Subscribers' Instruments	—	10	10	—		—	10	10·0	0	5	—	10	9·5	5	2	—	10	10·0	0	
Private Branch Exchange Boards	All Types	12½	8	—		—	10	10·0	0	5	—	8	10·0	20	2	—	8	11·3	10	
Central Office Switch Boards	All Types	12½	8	—		—	7	14·0	2	6	—	8	10·0	20	2	—	8·4	9·9	17	
Buildings	—	20	5	—		—	33	3·3	0	1½	—	40	2·5	0	1	—	24	2 6	38	

Figures not available.

* Extracts from Report of Special Telephone Commission, Chicago, 1907.

† Ordinary Depreciation.

‡ Extraordinary Depreciation.

Digitized by Google

APPENDIX II.

SIX METHODS OF DEALING WITH DEPRECIATION BASED ON TABLES CONTAINED IN "THE COMMERCIAL MANAGEMENT OF ENGINEERING WORKS," BY F. G. BURTON. THE SCIENTIFIC PUBLISHING COMPANY OF MANCHESTER.

ORIGINAL COST OF MACHINE, £1,000. ESTIMATED LIFE, 5 YEARS. ANTICIPATED EXPENDITURE ON REPAIRS AND RENEWALS, £120.

Year.	1st Method.			2nd Method.			3rd Method.			4th Method.			5th Method.				6th Method.		
	Annual Depreciation.	Actual Repairs and Renewals.	Total.	Annual Depreciation.	Actual Repairs and Renewals.	Total.	Annual Depreciation.	Actual Repairs and Renewals.	Total.	Annual Depreciation.	Actual Repairs and Renewals.	Total.	Annual Depreciation.	Interest 3 per Cent. Compound.	Actual Repairs and Renewals.	Total.	Annual Depreciation.	Actual Repairs and Renewals.	Total.
	£	£	£	£ s.	£	£ s.	£	£	£	£ s.	£	£ s.	£ s.	£ s. d.	£	£ s. d.	£	£	£
1st	200	—	200	500 0	—	500 0	224	—	224	181 0	—	181 0	188 7	—	—	188 7 0	400	—	400
2nd	200	10	210	250 0	10	260 0	214	10	224	190 1	10	200 1	188 7	5 13 0	10	204 0 0	190	10	200
3rd	200	20	220	125 0	20	145 0	204	20	224	199 11	20	219 11	188 7	11 9 6	20	219 16 6	100	20	120
4th	200	60	260	62 10	60	122 10	164	60	224	209 11	60	269 11	188 7	17 9 6	60	265 16 6	120	60	180
5th	200	40	240	62 10*	40	102 10	194†	40	234	219 17	40	259 17	188 7	23 13 0	40	252 0 0	190	40	230
TOTAL.			1130			1130 0			1130			1130 0				1130 0 0			1130

* Balance of total written off. † Difference between estimated and actual result corrected in last year.

Note.—The first method represents equal annual contributions towards depreciation.
In the second method depreciation is represented at 50 per cent. per annum on actual value of asset.
In the third method the total amount in respect of depreciation and repairs in each year is equal.
In the fourth method the net charge to revenue each year is the difference between depreciation and interest plus provision for repairs.
The fifth method contemplates the building up of a reserve fund.
The sixth method is arbitrary. In this case revenue is charged with the difference between the book value of the asset and its actual value at the present time, as estimated by an expert valuer.

Digitized by Google

APPENDIX III.

EXAMPLE SHOWING METHOD OF RECORDING TRANSACTIONS RELATING TO REPLACEMENT OF A SWITCHBOARD IN ORDER TO ADJUST CAPITAL ACCOUNT AUTOMATICALLY IN RESPECT OF THE SAME.

PLANT ACCOUNT.

Dr.		Cr.	
Switchboard installed	£2,000	Switchboard withdrawn	£2,000

DEPRECIATION RESERVE.

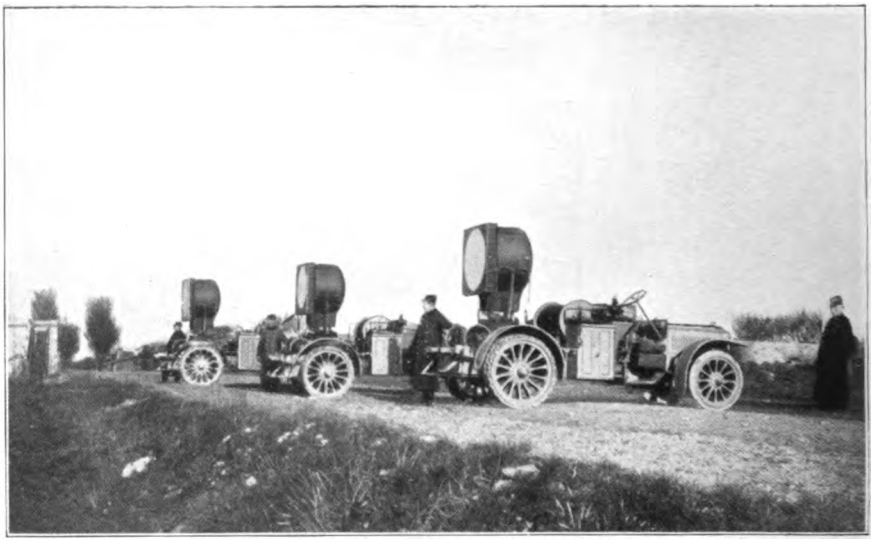
Dr.		Cr.	
Unexpired "Life" Value of Switchboard withdrawn ... .. (Price obtained for "Scrap" Value of Serviceable Parts credited to Plant Deductions).	£600	Set aside from Current Earnings for Depreciation on Switchboard:—	
		1st Year	£200
		2nd ,, ...	200
		3rd ,, ...	200
		4th ,, ...	200
		5th ,, ...	200
		6th ,, ...	200
		7th ,, ...	200
		Total	£1,400

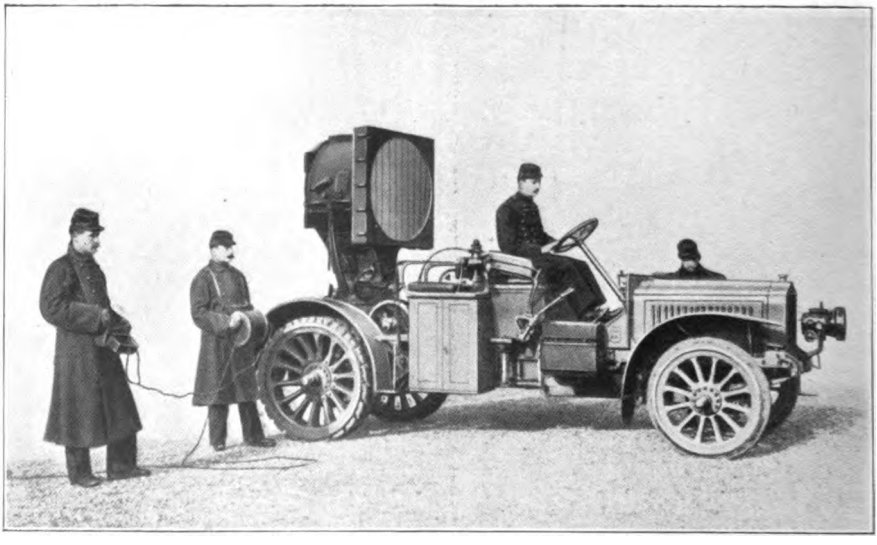
PLANT DEDUCTIONS.

Dr.		Cr.	
Switchboard withdrawn	£2,000	For Depreciation Reserve	£1,400
Cost of removing Board	170	For Sale of "Scrap"	130
		Value of Parts again returned to Service	280
		Loss (Current Expense)	360
Total	£2,170	Total	£2,170

Digitized by Google

Digitized by Google





FIELD AUTOMOBILE SEARCHLIGHT.

Digitized by Google

TRANSCRIPTS.

FIELD AUTOMOBILE SEARCHLIGHTS.

THE following is a translation of a pamphlet recently issued by the French firm Sautter, Harlé & Cie, who have a very long record of experience of searchlight work.

This plant was inspected in March and seen at work in Paris. As it had just undergone extensive trials during the "flood" weather round Paris and had come through them all very satisfactorily, it is thought that the short description may be of general interest, although of course it must be remembered that the pamphlet is compiled by the makers themselves.

"*The new automobile searchlight plant*" which we have just constructed answers to all the requirements of the present day tactics of an army in the field, and is also of use for coast defence purposes.

The carriage is very strong and at the same time light. It consists of a chassis provided with 4-cylinder petrol motor of 18-H.P. and a chain drive on the hind wheels.

The gear box has four speeds, and one reverse. It has very strong springs. The front tyres are of solid rubber; the hind wheels are extra large and are fitted with studs of rubber arranged "*en chevron*"—thus allowing the vehicle to traverse all kinds of ground.*

The engine runs on petrol; the ignition is high tension. It is remarkably flexible and silent. Lubrication is automatic. The cooling system is of the usual type and water consumption even at full power is negligible. The entire engine is very accessible in all its parts.†

The friction clutch, metal to metal pattern, is very flexible, it takes up the drive gradually and without any jarring to the mechanism.

The vehicle carries five men comfortably, including the driver.

Lamps are provided in front and in rear, and there is also one powerful acetylene headlight, which can be doused at will from the dashboard.

Projector.—This is placed on the body of the carriage, at a convenient height. It is 90 c.m. in diameter and has a metal (gold-plated) mirror. It is very light, weighing in fact only 950 lbs. (425 k.g.).‡ It is mounted on four rubber-tyred wheels which allow it to be easily wheeled along the ground.§

* This is of course doubtful but special attention has been given to the point, which is essential to a useful and reliable plant of this type.—*Trans.*

† This cannot be said of the dynamo, which is under the driver's seat.—*Trans.*

‡ This is really very light as it includes directing motors and a shutter.—*Trans.*

§ This is really a weakness for field work; because the wheels are some 14" diameter only, and have small 1½" tyres. The projector would soon stick in soft ground. This disadvantage could of course be overcome.

Digitized by Google

Electric Control.—The light can be either controlled by hand or electrically from a distance. The dousing shutter can also be controlled electrically.

The "distant control" has been brought to a high state of perfection. For this purpose one telephone cable of two conductors is sufficient, which allows for control within a radius of 330 yards of the vehicle. This cable is wound on two light drums, which can be easily carried by one man.

Lamp.—Finally the lamp can be extinguished; this is combined with the operation of opening and closing the shutter. The result is that there is quite an appreciable saving in the amount of carbons used, while the beam is "doused."

Accessories.—Specially made drawers and boxes are provided for all necessary accessories, carbons, drums of cable, telephones and a telescope.

Spares.—The boxes also contain all necessary spares and tools for the maintenance and running of the plant.

Dynamos.—The dynamo revolves continuously with the engine, and the circuit can be closed, while the vehicle is in motion. It is therefore possible to run the light at average power, at the same time that the plant is proceeding towards its observation position.

Observation of the Ground.—This is a great advantage, for reconnaissance by the directing officer is made considerably easier, and can be carried out as he approaches near the observation position, and also while he is moving along the road.*

Ease of Dismounting.—If it is necessary, (as may arise in coast defence), to get the projector into a position that is so very steep that the vehicle itself cannot get there, it is quite easy to remove the projector from the vehicle and to haul it to the selected spot. A 4-core cable is provided, 110 yards long, mounted on a drum on the vehicle, and which can be unreeled so as to connect up the projector with the dynamo.

The projector can also be put back on to the vehicle very easily by one man, by means of special gear.†

Complete Weight.—Speed.—This vehicle only weighs 3·45 tons (3,500 k.g.), on the road, which allows it to negotiate the most difficult tracks, ramps of $\frac{1}{7}$ and $\frac{1}{6}$ and on the flat to reach a speed of 20 m.p.h.

R.W.

* This would only be possible in very open country and where the roads ran along ridges.

† This gear consisted of a hinged pair of rails, and a block and tackle—it would take one man all his time to do this, and he would have to be a young Samson.

Digitized by Google

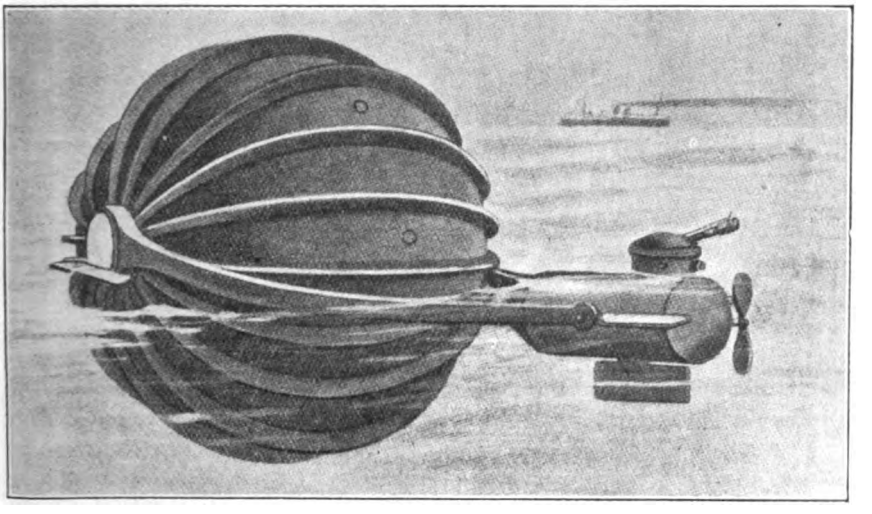
THE "CARL BAYER" SUBMARINE AND SURFACE BOAT.

From the *Kriegstechnische Zeitschrift*, April, 1910.

ALTHOUGH all the great sea powers of the world have been experimenting on submarines for many years and at great cost, they have none of them yet succeeded in producing a really seaworthy submarine capable of attacking hostile vessels at any time and under any conditions. The author thinks that success will not be obtained as long as the present type of elongated boat is adhered to, as it requires too much manœuvre room, is easily turned over in rough weather, and has no power of resistance.

The submarine invented by Carl Bayer of Stuttgart is declared to be free from these defects, and has consequently attracted considerable attention in Germany, where it has been patented.

The inventor was struck by the slow progress made in submarines and was led to ascribe it to their external shape, and it occurred to him that a form resembling two hollow bullets coupled together would be more efficient.



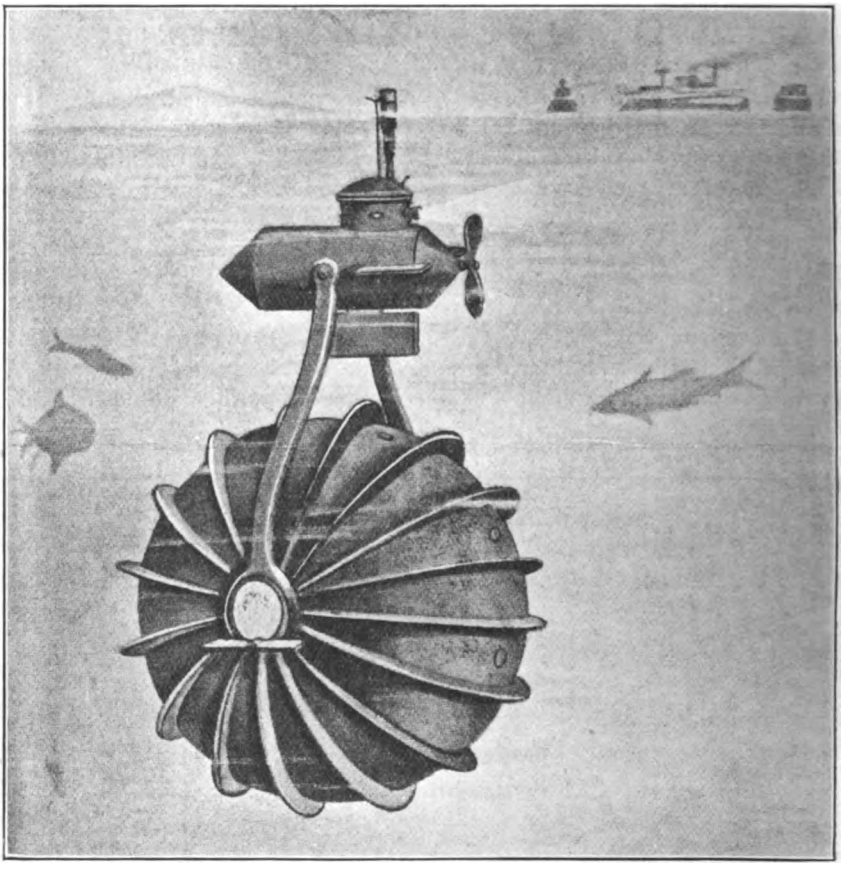
NO. 1.—*Submarine Travelling on the Surface of the Water.*

The chief requirements of a submarine are that it should be stable and capable of rapidly turning in any direction without any risk of being capsized; furthermore it must be able to sink quickly beneath the surface at any moment, and remain under water at any given spot. A submarine

Digitized by Google

should also be of great value in discovering the whereabouts and strength of the enemy's fleet. As the "Carl Bayer" travels equally well on or under the surface and has a high turn of speed, it seems exceptionally well equipped for scouting work.

The first illustration shows the vessel on the surface of the water, moving from right to left with a speed of 30 knots. It is claimed that a speed of 100 knots will be obtainable because the faster the spherical portion revolves the less is the draught and consequently the friction.



No. 2.—*Submarine at Rest Under Water.*

The main part of the vessel consists of two concentric hollow spheres, one inside the other. The inner one is so pivoted as to remain always in the same position, while the outer one rotates in cylindrical hollow trunnions.

The steering mechanism is accommodated in a separate cylindrical chamber connected with the rest of the vessel by a large buckle or coupling.

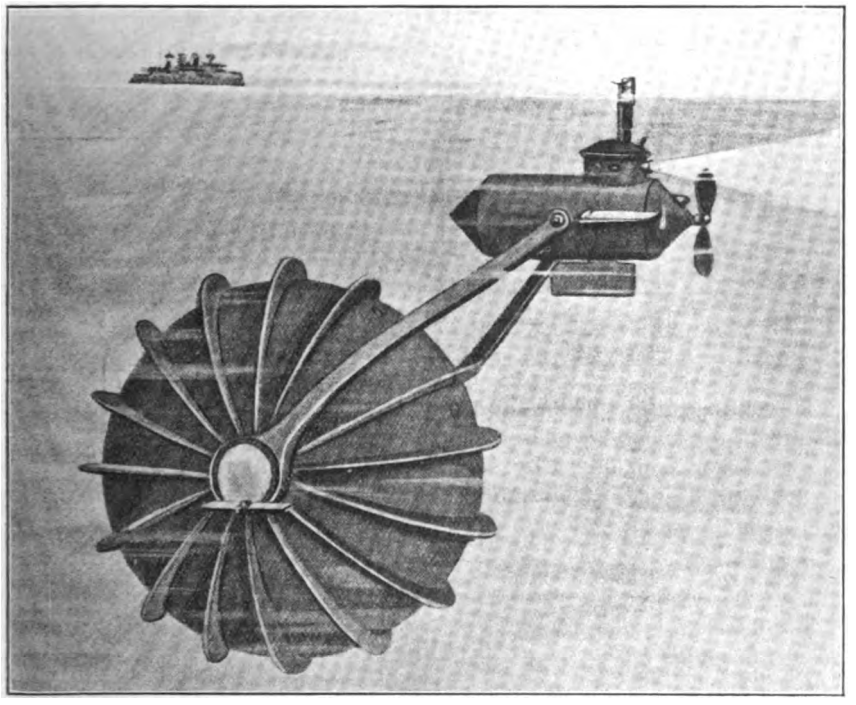
Digitized by Google

The inner sphere hangs on ball bearings on the axle of the outer sphere in such a way as to remain stationary while the outer one is rotating.

The motive power is provided by a dynamo in the inner sphere which rotates the main axis, and, with it, the outer sphere which is provided with paddles on the outside as shown.

The steering chamber is provided with horizontal and vertical rudder planes and a screw propeller.

There is accommodation here for two men, one to steer, and the other to use the periscope.



No. 3.—*Steering Chamber Moving into Position for Travelling Under Water.*

The space between the inner and outer spheres is a vacuum, and when the vessel is to be used as a submarine water is admitted into this space until it sinks to the required depth, and the steering cylinder is similarly treated.

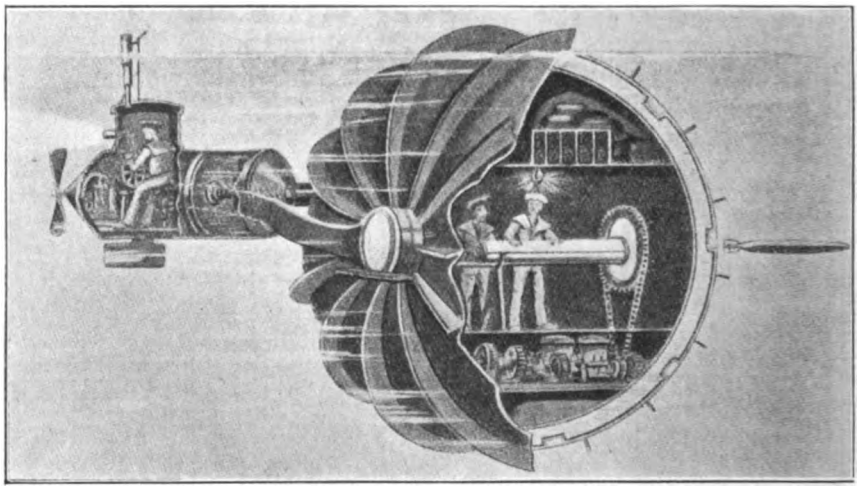
When under water the external sphere no longer revolves but the vessel is driven by the screw propeller on the steering cylinder. The depth is regulated by the horizontal rudder planes and the direction by the vertical ones.

The steering chamber is in this case in front and the two spheres trail behind.

To take observations, if the screw is reversed and the rudder planes slightly tilted, the steering chamber can be driven into a position vertically

Digitized by Google

above the spheres and, by adjusting the amount of water in the air-tight chamber, the level required to take observations through the periscope can be attained.



No. 4.—*Section through Submarine.*

To return to the surface the water is pumped out of the cylinder and also from the space between the two spheres.

The writer concludes by saying that exhaustive experiments were made with a large-sized model at Stuttgart and proved thoroughly successful.

C. OTLEY PLACE.

Digitized by Google

NOTICE OF MAGAZINE.

BOLLETTINO DELLA SOCIETÀ AERONAUTICA ITALIANA.

October, November, 1909.

A long paper on winds in Italy which has been running for some months, is concluded with an interesting series of maps of Italy showing prevailing winds in different quarters of the year; in the hot and cold months during the year; and throughout the year. Also showing the frequency with which each wind blows during each quarter of the year in each locality.

Such investigations entail a very large amount of labour, and the results concisely put in a few coloured maps, must be of the greatest use to Italian balloonists. It is to be hoped that some time in the future our meteorologists will do the same for the British Empire.

S. Laboccetta begins an article which discusses the question of the relative excellence of airships of diverse types. Capt. Castagneris has also discussed the same question at length. An attempt is made to arrive at a formula, but the article is not finished in this number.

M. Riabouichnski contributes an interesting photograph of currents set up by a square plate in an air stream, and also a proposal to furnish "Balloons Souda" with small flags which would be dropped from time to time automatically, compensating for the loss of gas. He thinks that thus a balloon might keep up for a very long time.

An account is given of the proceedings of the IVth International Aeronautical Congress. Official delegates were sent by the Governments of Belgium, France, Italy, Russia and the United States. England and Germany were not represented.

Commandant Bouttieaux reported the progress made with dirigible balloons. The "Zeppelin" has achieved voyages up to 23 hours in duration and up to 1,400 k.m. The speed is reported as 50 k.m. per hour and the height reached as 1,200 m.

The "Gross" has voyaged for 13 hours and has a velocity of 47 k.m. per hour.

The "Parseval" is particularly noted for the ease and rapidity with which it was filled in the field, and although it met with a bad accident it was out again in six days. It has reached an altitude of 1,500 m. and manœuvred there for over an hour. Its speed is 47 k.m. per hour.

Stress is laid on the necessity for having two motors and two sets of propellers. The first is a recognized necessity, but provided each motor can work the propellers there does not seem the same necessity for the others. A large reserve of ballast is also laid down as requisite.

Digitized by Google

As regards flying machines Commandant Renard pointed out the importance of laboratory experiments, and how little these were regarded by the public and even by constructors, compared with the results of experiences of practical aviators. He very truly remarked that, but for the laboratory work of a century, there would to-day be no practical aviators.

In communicating the results of the Brescia meeting, Capt. Castagneris expresses himself very confident of the future of aviation as a practical means of transport. He points out that immense strides have been made in only four years, far greater progress in a short time than has been made with any other means of transport, and even expects to see dirigible balloons as locomotives dragging others behind them just as railway trains are built up behind the engines.

He also notes the results of other aviation meetings and mentions a variety of points that ought to be considered in fixing on the ground for an aviation meeting—viz.: a large enough circuit, smooth surface, direction of prevailing winds, a good starting place, methods of judging and signalling, position of sheds, etc.

He also communicates a very appreciative account of the late Capt. Ferber.

At the Paris Salon he selects the Santos Dumont, Bleriot, and Antoinette monoplanes, in the order given, as best complying with the technical demands of aerodynamics.

Notes are given on a large number of aeroplanes, all modifications of well-known types, and an ornithoptères, none of which have yet proved successful.

There is an interesting article on dirigible balloons at military manœuvres, and a discussion as to the requirements of war as regards these machines. The writer favours, I think rightly, different types, viz.: large cruisers for strategical work, and smaller vessels for tactical work. He considers that details of a battle will be reported by aeroplanes, general information by dirigibles.

An account is also given of the journey of the Italian military dirigible "I. Bis," from Vigna di Valle to Naples and back *viâ* Rome to its hangar. The journey was entirely successful, Naples was reached in 5 hours 45 minutes. On the return journey Rome was visited (10 hours from Naples) and a descent made for petrol. The departure from Rome was delayed owing to a fatal accident to an officer, the return from Rome to Vigna di Valle being made in 1 hour. The total distance run without descending was 460 k.m. in 14 hours.

J. E. CAPPER.

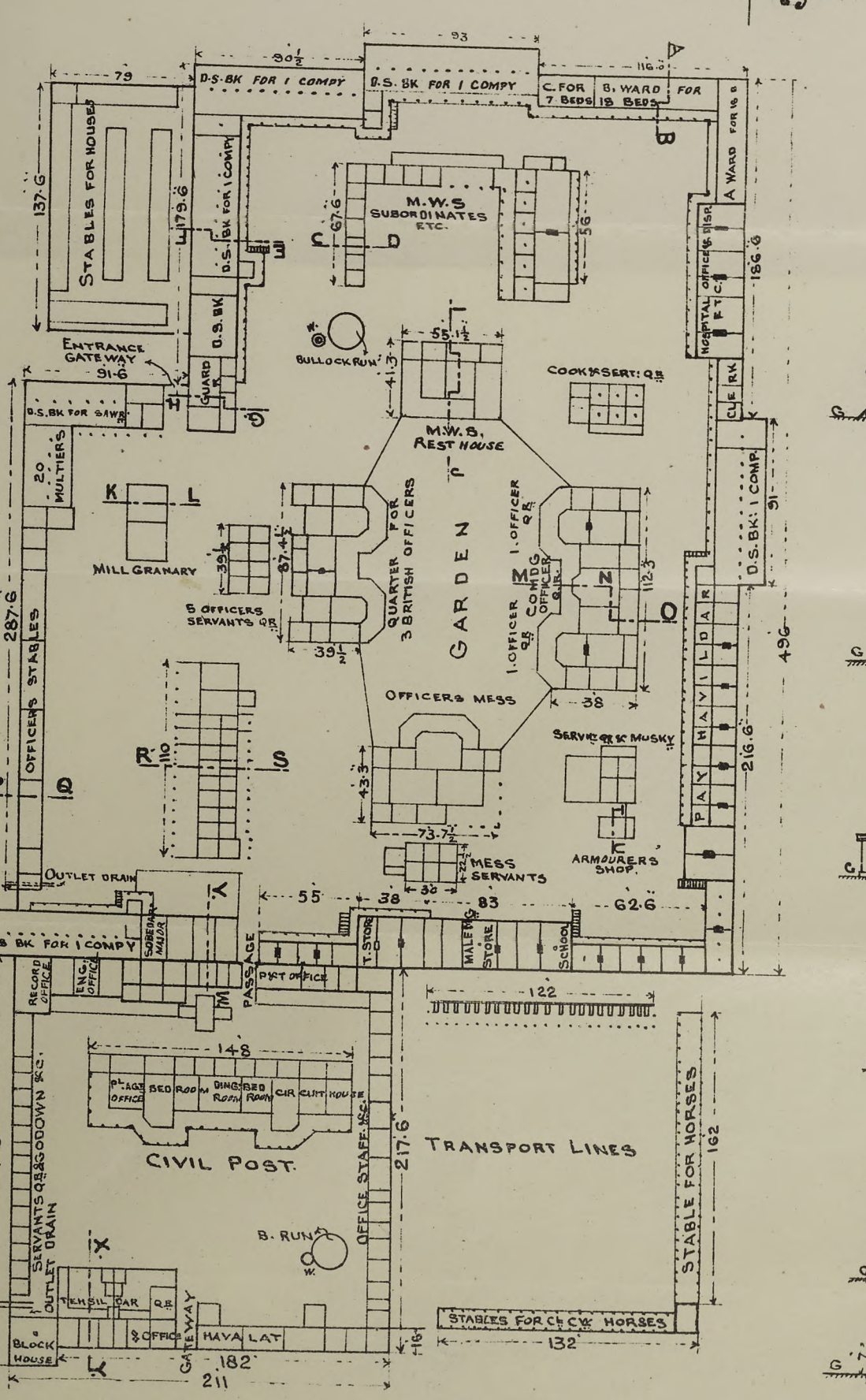
Digitized by Google

MILITIA POST, MIRANSHAH, TOCHI VALLEY

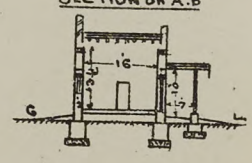
Scale for Plan—80 Feet=1 Inch.

FT 80 70 60 50 40 30 20 10 0 — 40 30 20 10 0 — 80 40 — 160 80 — 240 120 — 320 160 — 400 FT 200 FT

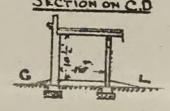
Scale for Section—40 Feet=1 Inch.



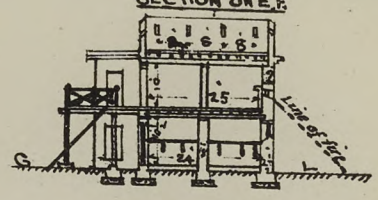
SECTION ON A.B



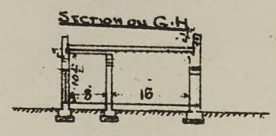
SECTION ON C.D



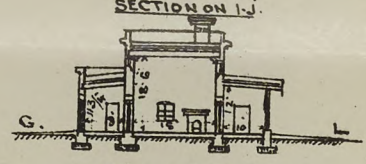
SECTION ON E.F



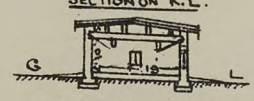
SECTION ON G.H



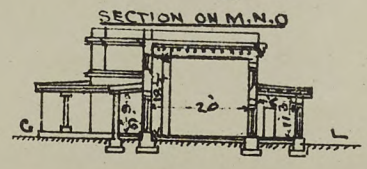
SECTION ON I.J.



SECTION ON K.L.

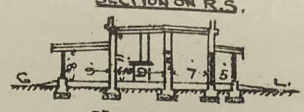


SECTION ON M.N.O

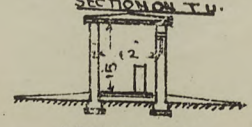


SECTION ON P.Q.

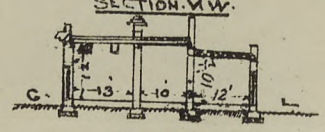
SECTION ON R.S.



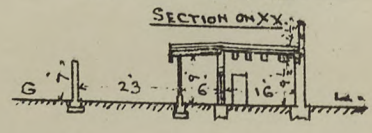
SECTION ON T.U.



SECTION ON V.W.



SECTION ON X.Y.



Ahmad Shah
5/16/3/10

Colonel
Secretary to the Chief Commissioner
N.W.F. Provine P.W.D.
dated 16.3.10
185-10

Digitized by Google

Digitized by Google

Digitized by Google

BRIDGING BY THE 1st P.W.O. S. & M.

General view of bridge from West bank.

Ferry boat on the Beas River.

Bridge cut to allow rafts to go through.

Digitized by Google

BRIDGING BY NO. 1 COMPANY, 1ST P.W.O. SAPPERS AND MINERS, DURING THE LAHORE DIVISION MANŒUVRES, 1909.

By LIEUT. W. CAVE-BROWNE, R.E.

IN November and December, 1909, the 3rd (Lahore) Divisional Manœuvres took place over the country lying between Amritsar and Hoshiarpur.

As the greater number of the troops came from west of the river Beas, which formed the western boundary of the manœuvre area, it was necessary to arrange for crossings for them, as there are no permanent road bridges over the Beas in this district and all the country traffic crosses by ferries.

It was decided that two temporary bridges should be built, one just below the North Western Railway's bridge and the other about 50 miles upstream at Naoshera. No. 1 Company was detailed to build the latter bridge and left Roorkee on October 5th by train for Jullundur, whence a four days' march brought them to the site of the bridge.

The site of the bridge had been previously reconnoitred and a rough estimate of materials had been sent to the Divisional Headquarters, but on arrival it was found that, by some mistake, nothing had been collected. It was therefore necessary to make arrangements with all possible haste, as the bridge was required by November 8th. Thanks to the assistance of the Forest Department and a local contractor, the necessary material was not only obtained, but obtained free of charge. The forest authorities gave permission that all Government wood, which was being floated down the river in rafts, might be stopped for this work, on condition that it was neither cut nor spiked, and that it should be re-rafted after the bridge was dismantled. Besides this, the contractor who rafts wood down the Beas from the Kulu forests for all the smaller traders, agreed to send down rafts of sleepers and spars on the same conditions as above.

All wood comes down the Beas in form of spars or sleepers, the latter, being 10″ × 5″ in cross section, vary in length from 6′ to 12′, while the former are of all lengths up to 22′ and of all sizes up to 10″ in diameter.

The other material available was seven ferry boats belonging to the local ferry. The loan of these was also obtained free of charge, for directly the bridge was complete it was open to all traffic, including

Digitized by Google

bullock carts carrying not more than 30 maunds (about 1 ton), and the ferry contractor was allowed to charge the usual ferry fees for all civil traffic crossing the bridge.

At the site of the bridge the river was 680′ broad; out of this for 50′ from the west bank a causeway was made of earth and grass, and of the remainder for a distance of 180′ the stream was from 9′ to 15′ deep and running at 3 miles an hour, while over the remaining 450′ the depth was in no place greater than 5′. In the deep water the ferry boats were used and in the shallow water, trestles.

These ferries are large flat-bottomed boats, their average length being 35′ and their breadth at the stern 16′; towards the bow the breadth decreases to 10′. The gunwale all round is about 2½′ high, except for a length of 10′ on one side where it is only 1′ high to allow of carts and animals embarking and disembarking. At the bow the gunwale is continued up in the form of a large triangular screen to a height of 10′. Tradition has it that the followers of Alexander the Great built boats of this type with the triangular screens to protect themselves from the arrows of the natives when crossing the river.

The boats are made entirely of sheesham wood and have cross ribs on the bottom at intervals of about 2½′; on these ribs a cribwork was built up to about 6″ above the gunwales, as shown in *Fig.* 1.

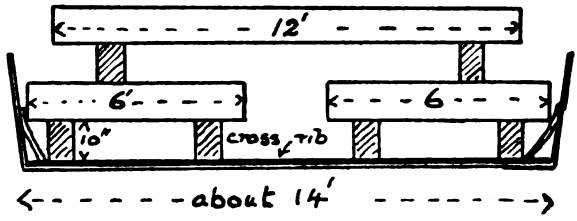


FIG. 1.

The centre line of the crib was about 12½′ from the stern of the boat, as by this arrangement the bows were just clear of the water when the roadway was loaded.

The bays between boats were from 13′ to 15′ long, and five of the best spars were used as road bearers over each bay.

The boats were all anchored to a 3″ steel cable stretched across the river about 100′ upstream of the line of the bridge, carried at each end over sheers.

Photo No. 2 gives some idea of the boats and their usual load. In bridge they drew 9″ when fully loaded.

To allow rafts of wood to pass through, one boat was arranged for a cut, and a snatch block was fixed on the anchorage cable, over which ran a 3″ rope fixed to the boat, and by this means the boat was pulled above the bridge and then pushed aside by bamboos. The breadth of the cut was 36′.

Digitized by Google

In the shallow water two-legged trestles were used throughout, as it was found that four-legged trestles offered too much resistance to the water, with the result that it scoured out the sand below and the four-legged trestles kept on sinking.

The legs were all of spars of 5″ diameter and greater. For the transoms the best 12′ sleepers were chosen, and on them were laid three sleepers on edge for road bearers, and the flooring throughout was of sleepers with 6″ of grass strewn on top. At one time it was feared that sufficient sleepers for the roadway would not be obtained, and so the expedient of using reed fascines, interposed between sleepers, was tried. There were acres of high reeds growing in the neighbourhood, standing about 12′ high which made excellent fascines. The fascines were 10″ in diameter and two were placed between every two sleepers. With this arrangement, instead of three sleepers on edge, five on the flat were used for road bearers (*Fig.* 2).

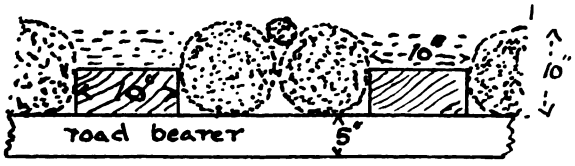


FIG. 2.

This was found highly satisfactory, as the fascines formed good cushions and saved the lashings a large part of the jar caused by field guns. This arrangement was, however, only used over a few bays, as sufficient sleepers arrived in time and this somewhat lengthy process was abandoned.

The distance between trestles was 10′. The bridge was cross-braced parallel to its length, and downstream struts were placed for every second trestle.

The lashings were entirely of wire; No. 14 S.W.G. being used. It was calculated that 29 returns on the transoms were required, and so it was decided to first wind the wire treble and put on only 10 turns. By this means much time was saved and the lashings were considerably stronger, as it was found that when the lashings were of single wire, only the top returns took the strain at first, and until these snapped the lower ones were doing no work.

The bed of the river was sandy, and considerable trouble was caused by the sand constantly shifting. A boat was originally put in the middle of the trestles, for it was intended to have the cut there, but within a week of completing the bridge the stream changed its channel to such an extent that the boat was left in only 1′ of water. It was therefore necessary to take out the boat and replace it by trestles and arrange for the cut elsewhere.

Digitized by Google

It is difficult to say how many days the erection of the bridge actually took, for on two or three occasions the work was stopped for two days, waiting for more wood to come down the river. These days were spent in improving approaches and making a road over the sand from the bridge to the nearest metalled road.

From the time the bridge was open to traffic on November 4th it was in constant use, the chief traffic being bullock carts, mules, carts and pack camels.

On the day that the troops dispersed, two batteries R.F.A., two cavalry regiments, and three infantry regiments with all their 1st and 2nd line transport crossed the bridge in three hours.

The dismantling of the bridge and forming the material into rafts occupied 16 hours.

Photo No. 3, taken from the west bank, shows the bridge cut to allow rafts to go through; the cut boat is seen upstream of the bridge.

Photo No. 1 gives a general view of the bridge from the west bank.

Digitized by Google

THE CALCULATION OF WORKING PARTIES IN A DEFENCE SCHEME.

By CAPT. E. N. MOZLEY, R.E.

THE planning of defences is a great deal more interesting, and gives opportunity for much more genius, than the after calculation and organization of the work. Organization, however, takes so high a place to-day among the military virtues, that it may almost be said that the good military engineer is not he who plans the best defences, but rather the man who gets the work done in the quickest time. The textbooks too, which give the most excellent descriptions and pictures of the various military engineering works, say but little about the organization of their construction. It is true that in the *Manual of Military Engineering*, 1905, there is a specimen given (on page 136A) of a "detail of working parties," but the description is rather hard to follow, and the latest edition (1908) of Part I., *Military Engineering*, says even less on this subject. As however it is a matter in which practice is needed more than in most things, and as, incidentally, officers going through promotion examinations have to exhibit great readiness in such calculations, it will perhaps not be out of place to describe a system somewhat more precise than has hitherto been in vogue.

A defence problem has two parts :—

(A). "What to do?" This includes the decisions as to the use of the ground and the tactical position of the troops thereon. These decisions are based upon (1), the inspection of the ground with a map, or of the ground alone, or (chiefly in the case of examinations) of the map alone, and (2), of the special idea and orders of the commander of the force.

(B). "How to do it?" That is to say an investigation of the work required to place the ground in the state of defence decided on in (A), resulting in complete tables of reliefs of working parties.

The first step in the organization of the defence of a position is, usually, to split it up into sections, and it is assumed that we are treating of the defence of one of these sections and that its commander, in conjunction probably with technical advisers, has come to the conclusions which the first part of the problem requires.

The question at once arises, "Can the work be done in the time available and by the working party available?" If not, the tactical scheme (A) must be modified unless more time can be hoped for or a larger working party obtained.

Digitized by Google

The time available is of course doubtful. Still something, the probable minimum, must be assumed, and the defences must be planned and constructed, not only so as to be complete in their way at the expiration of that time, but also so that, if more time is eventually available, the whole defences will admit of strengthening and of enlargement.

The working party available is generally fixed, and is usually the force which is to occupy the works together with any civil labour which can be obtained.

It will be seen therefore that the question resolves itself into a kind of equation between the work to be done on the one hand and the time and labour on the other, and will be treated as such.

Hitherto it has been the custom as soon as the work to be done has been decided upon, to embark at once upon detailing the working parties. The wisdom of this step is however questionable. The commander of a force will naturally call for as strong defences as possible, but, unless the work is first measured up, no idea as to how long it will take can be arrived at, and it is more than likely that the defences will be quite unfinished in the time allowed. To start big works only to find them unready when the enemy attacks is much less satisfactory than to have completed smaller works.

It is therefore recommended that, as soon as the defences have been planned, an estimate of the time and labour they will take to complete be at once made out. Such an estimate is here called the "Table of Work." As a mere arithmetical process it will not take long to do, nor will it delay things, as the troops can be started at work on such jobs as clearances, immediately they arrive on the ground. Moreover such a table will be of great assistance when making out the detail of working parties afterwards.

THE TABLE OF WORK.

1. Write down the "Conditions" of the situation under the following heads :—

(*a*). *Garrison.*—(On this will depend the length of fire and support trenches).*

(*b*). *Working party available* (distinguishing between Infantry, Artillery and Engineers), and transport available.

* A rough rule, sufficiently accurate for general purposes, is to prepare accommodation for $\frac{2}{3}$ (firing line and supports). If N be the number to be housed in the support trenches, since each man requires at least 2′ laterally :—

Minimum length for a support trench accommodating men in a single row = $2N$ feet.

Ditto for a trench accommodating two rows of men = N feet.

These dimensions should be considerably increased, if time allows, for comfort.

Digitized by Google

(*c*). *Time available.*

(*d*). *General decisions* as to the preparation of the ground, under the usual main heads of field defences, cited in *Military Engineering*, Part I., para. 125, (*Manual of Military Engineering*, para. 1).

These main heads are as follows :—

(I.). *Clearance* (including demolitions and marks to show ranges).

(II.). *Cover.*—This will include fire trenches, support trenches, cover for guns, defence of houses, stockades and all improvement of existing cover.

(III.). *Provision of Obstacles.*

(IV.). *Improvement of Communications.*—This will include communication trenches* between fire and support trenches, improvement of roads for artillery, lateral communications for machine guns, etc.

These general decisions should be in the form of a *numerical* summary.

When the defence scheme is planned details and dimensions are not exactly laid down. They are therefore alterable and the amount of work in the scheme can thus be modified. Certain assumptions as to quantity and dimensions of the various works are made at this stage of the calculations, and these assumptions can be and will have to be altered if it is subsequently found that the work to be done does not correspond with the "men-hours" labour available to do it.

(*e*). *Tools Available.*—Including tools obtained from civilian sources. It is useful to note here the number of men who can concurrently be employed with (1) cutting tools, (2) entrenching tools. These facts will have to be borne in mind when getting out the detail of working parties later.

(*f*). *Materials Available.*—It is again useful to note down the quantity of certain descriptions of work which can be undertaken with the materials available, *if there is any scarcity of materials, e.g.*,

Overhead cover, in square feet.
Revetment, in square feet.
Abatis, in foot-run.
Wire entanglement, in square yards.

2. The number of men-hours labour available should be written down. It is usual to allow each man to work $\frac{1}{3}$ of the total time,

* In calculating communication trenches proceeding from front to rear of the position, wherever these are liable to enfilade (as is commonly the case), they must be either (*a*) traversed at frequent intervals, or (*b*) covered in (with air openings at intervals), or (*c*) zigzagged at a sufficiently sharp angle.

We may roughly estimate that in such cases 50 per cent. should be added to the time required to excavate a straight uncovered trench between the two points joined by the communication trench. This estimate will however vary with the frequency of the traverses, the span of the covering or the angle of zigzag.

Digitized by Google

though for a short time and if the work is not too arduous, he can be called upon to work 12 hours out of the 24.

The men-hours available of Infantry, Artillery and Engineers must be kept distinct. Artillery are not usually required to do work other than prepare their own emplacements and communications, for which they generally have sufficient labour without outside help. Engineers are employed either to superintend infantry working parties, or on the more difficult and technical work.

3. The work to be done can next be written down in tabular form. This may be called the "Table of Work." It should be in the following form :—

Table of Work.

Nature of Work. *e.g.*	Quantity.*				Rate per M.H.	M.H. Labour Necessary.	Remarks.
	Length.	Breadth.	Depth or Height.	Contents.			
Clearance							
Excavation.....							
Revetment.....							
Loopholes							
Overhead cover ...							
Stockade							
Sangar							
Cover for guns							
Defensible buildings							
Obstacles							

* The dimensions shown in these four columns will be expressed in the following units :—

Clearance.—Length in yards. Breadth in yards. Contents in square yards.
Excavation.— ,, feet. ,, feet. Depth in feet. Contents in cubic feet.
Revetment.— ,, ,, Height in ,, Contents in square feet.
Loopholes.—Contents show number of loopholes.
Overhead Cover.—Length in feet. Breadth in feet. Contents in square feet.
Stockade.— ,, ,, Contents show foot-run.
Sangar.— ,, ,, ,, ,, ,, ,,
Cover for Guns.—Contents show number of emplacements.
Defensible Houses.— ,, ,, ,, houses.
Obstacles.— (1). Abatis, length in yards. Contents show yard-run.
(2). Wire entanglement, length in yards. breadth ,, } Contents in square yards.

Digitized by Google

Only the most usual kinds of work are quoted in the first column of the foregoing table. If other jobs have to be executed, they can be included and the M.H. labour necessary to complete them will have to be estimated and added in to the total.

The "quantity" columns have to be filled in, partly from the conditions laid down in the "general decisions," and partly, where these conditions do not completely specify the dimensions, by a rough estimate. For example the average cross-section for a fire trench might be 15 square feet, the height of revetment for a high relief trench 3′ to 4′, the breadth of overhead cover 4′ for single row and 8′ for double row accommodation, etc. It is impossible for such estimates to be accurate and it is waste of time to try to get them so. Any attempt, for instance, on the part of the superintending engineer to lay down what should be the exact command of a fire trench (on which the cross-section depends) is unsound, unless he has had time to examine carefully the site of each trench, which is not often the case in large schemes on service. Such points must be left to the judgment of the executive officer. For the same reason it is difficult to see how candidates at examinations can be expected to state what size of parapet they would build at any point on an ordinary map. Engineers in general charge must rely on estimates, and the more practice an officer obtains in such estimates the fewer will be his errors, and such errors as remain will tend to neutralize each other in the calculation of several works.

The column in the table "Rate per man-hour" may be taken from a "Table of Rates of Work" such as that given at the end of this article. This table has been compiled partly from the textbooks and partly from other experience.

The column "Men-hours labour necessary" is of course obtained by dividing the number shown in the "Contents" column, by the number shown in the "Rate per man-hour" column, taking care that both are expressed in the same units.

The total number of men-hours labour necessary to carry out the whole defence scheme is then obtained by adding up the column "M.H. labour necessary."

4. The following has now been obtained :—

(*a*). The number of men-hours labour available.

(*b*). The number of men-hours labour required.

These two must be roughly equalized in order that the whole work may be completed approximately in the time available.

If (*a*) is less than (*b*) the scheme is too ambitious and cannot be carried out in the time. Alterations and reductions must be made, but as far as possible without affecting the decisions of the commander of the force, which were arrived at in (A) (see page 69).

Digitized by Google

We have however some latitude of choice without affecting these decisions. Certain assumptions were made in the numerical summary of the work to be done which can now be altered. The principal assumptions which can be altered are as follows :—

Cross-section of fire, support and communication trenches. (But the *command* of fire trenches cannot be interfered with).

Length of support trench.

Nature of Obstacle.—If the apparent efficiency of an obstacle is maintained it may be less carefully built. High wire entanglement is usually quicker to build than an abatis covering the same area.

Width of belt of obstacle (parallel to the advance of the enemy).

Number of communication trenches between fire and support trenches.

If the two sides of the equation cannot be made approximately equal by such alterations, it will be necessary to revert to the general scheme (A) and to modify it. This however will probably involve some tactical rearrangements. Such a change is open to the criticism that tactical considerations are being hampered by the technical services. Unfortunately this must often occur as even tacticians have to cut their coat according to their cloth.

If (*b*) is less than (*a*), the works can be improved and strengthened as thought desirable, not forgetting, however, that the *materials* available may be limited. All defence schemes should be planned with an eye to possible enlargements, if time allows.

5. Before proceeding to get out tables of working parties it may sometimes be worth while to ascertain roughly :—

Firstly, that the work proposed does not call for more material than is available.

Secondly, that there is no such overwhelming proportion of work of one kind, *e.g.* entrenchments or clearance, that the tools available will not allow the whole of one relief to work simultaneously.

THE DETAIL OF WORKING PARTIES.

6. We can now get out the table of reliefs of working parties which is a document intended for the use of subordinates and should therefore be quite clear. It may take the following form * :—

* The form here given is substantially the same as that on page 136A, *Manual of Military Engineering*, 1905. The only alterations are :—

(*a*). Each party is given a letter for convenience of reference.

(*b*). The column "Task per man" is omitted, being a detail which may be left to the executive officer.

(*c*). Tools and materials are not so closely specified, for reasons given later.

Digitized by Google

Detail of Working Parties.

Col 1.	Col. 2.	Col. 3.	Col. 4.	Col. 5.	Col. 6.	Col. 7.	Col. 8.	Col. 9.
Letter of Working Party.	Inf.	R E.	Where at Work.	Nature of Work.	Total Quantity to be Executed.	Tools.	Materials.	Remarks.
A. B. C. etc.	The total in each of these columns must equal ⅔ or ½ of the total available working party, according as it is proposed to work men 1 relief in 3, or in alternate reliefs.		Refer to the letter on the plan of the ground by which the work is designated.		Should be expressed in the following units:—(1). Cubic feet of trench. (2). Yard-run of abatis. (3). Square yards of H.W.E. or L.W.E. (4). Foot-run of stockade. (5). Number of epaulements and defended houses. (6). Square yards of clearance.			This column should state:— (*a*). If a trench is to be traversed and concealed. (*b*). If a dummy parapet is to be formed and where. (*c*). If the trench is to be covered. (*d*). The width of the obstacle. (*e*). Cross-sections of trenches, obstacles, epaulements, stockades, etc., or reference to figures in the instructional manuals. If the executive officer is to use his own discretion as to such points (as will usually be the case with sections of *firing* trench) it will be so stated. (*f*). Transport available.

1st Relief.—8 a.m.—12 a.m.

Place and hour of parade for drawing tools { .... }

In making out the above table, Columns 2, 5 and 6 are the important ones and should first be dealt with.

Digitized by Google

Column 5 is the decision arrived at as to the chronological order of the various works.

The following points should be borne in mind :—

(*a*). Execute the work in the order of importance, which is generally—clearance, cover, obstacles, communications. For example, if a house has to be put in a state of defence loophole it first and barricade the entrance afterwards.

(*b*). Do not lay down an impossible order of work, such as building an abatis before cutting down the trees of which it is to be composed.

(*c*). Begin preparations simultaneously along the whole position, so that in case of sudden attack there may be no localities absolutely unprotected from an enemy's assault.

(*d*). Do not employ more men simultaneously at one kind of work, *e.g.* entrenching or clearance, than there are tools for.

(*e*). Remember that there is a limit to the number of men who can be put to any job at the same time. If too many are detailed, they will get in each other's way, or some will be idle.

A good rough rule for the greatest number who can be employed in trench work is as many men as there are yards-run of trench. This allows a certain number to be employed in collecting sods, filling sandbags, and concealing the parapet, and may also provide for double-manning tools, cross-lifting earth, etc.

Column 6 presents no difficulty when the work is begun and finished in the same relief. In such a case the total work, in the units laid down, will be inserted, and the word "Finish" may be added.

If however the job will take several reliefs to complete, the matter requires a little more detail.

It has been the custom to calculate and lay down precisely in the table of working parties how much each relief shall complete in such cases. This system gives much work to the officer who compiles the table and is contrary to the true principles of organization. Nor is the method a practical one. The difficulty, and therefore the rate of executing work, varies greatly with the nature of the soil or of the undergrowth in clearances, and with the weather, etc., and is sometimes affected by the chance of annoyance by the enemy. All these are matters for the executive officer, and the following system is therefore proposed instead :—

Digitized by Google

If a job extends over more than one relief, the total task will only be shown in Column 6 of the relief in which it is begun. But in this column will be shown in each relief the *fractional proportion* of the work which should be completed by the end of that relief (obtained by dividing the number of men-hours allotted to the job up to the end of that relief by the total number of men-hours labour allotted to the job from the table of work). The word "Finish" may be inserted in Column 6 of the relief in which the job is to be completed.

Now as a practical measure, in order to ensure continuity of work and to see that each relief does its fair share of work, an officer should be placed in charge of any such job, which continues through several reliefs. His duty will be to decide how much work each relief is to complete before breaking off, *i.e.* what work is the equivalent of the fraction shown in Column 6. This officer will be responsible that the job is completed at the end of the last relief allotted to it, unless there is good reason to the contrary, such as unexpectedly hard ground, bad weather or the enemy's bullets. If necessary he must be empowered to keep his reliefs longer at work by double-manning the tools.

An example of this system is given. Suppose there is an entrenchment, containing 14,000 cubic feet, to be dug, and that it requires 800 men-hours to complete. The troops are working in 4-hour reliefs. Let us suppose that 60 men are told off to the job in the first relief, 100 in the second and 40 in the third. (This will provide the necessary 800 men-hours).

Under the proposed system the execution of the work would be shown in the Detail of Working Parties as follows :—

1st Relief.

D	60	2	Trench "w"	Excavate	14,000 C.F. $\frac{3}{16}$	40 picks 60 shovels	.....	Pl.... Fig....

2nd Relief.

K	100	3	Trench "w"	.....	$\frac{1}{8}$	70 picks 100 shovels	.....	*Vide* D

3rd Relief.

Q	40	2	Trench "w"	.....	Finish	20 picks 40 shovels	.....	*Vide* D

Digitized by Google

In short by this system the executive officer is given a certain number of "men-hours," and is then held responsible for carrying out the work with them.

Keep the number of parties in each relief as few as possible. It is better to delegate responsibility to *officers* in charge of large parties (each party being perhaps distributed in detachments at several similar jobs) instead of to *N.C.O.'s* in charge of single small parties.

Column 2 is the selection of the strength of parties, on which depends the rate of progress of the various works. The note given in the table should be attended to.

Column 3 is filled in after Column 2. The number of R.E. superintending infantry labour should be roughly proportional to the size of the parties, though as a rule constructive works, such as entrenchments, require more supervision than destructive works, such as clearance. Works, such as defence of houses, demolition of houses (with gun-cotton), loopholes, overhead cover and stockades require a much larger proportion of R.E. labour. When R.E. supervise infantry they are not included in the M.H. labour done.

The remarks column (9) should give sufficient information as to the job itself for the executive officer to have no doubt as to what is required. The note given in the table explains what are the principal points upon which information is likely to be needed.

Columns 7 and 8 will next be filled in. As regards tools (Column 7) :—

Although hitherto it has been the custom to name these in precise detail, this is not absolutely necessary and there often will not be time to do so. Indeed if there were unlimited stores in the depôt or park, it would not be the place of a staff or R.E. officer to detail tools at all, as every executive officer ought to know what he requires for a job and is the man chiefly interested in getting the right tools. Since however the tools available are generally very limited, it is necessary that the allotment of the *principal* ones should be decided by a central authority to avoid disorganization. Not only the officer in general charge but also the storekeeper must make sure that they have enough important tools for all parties in each relief and to this extent the issue must be controlled. It is scarcely necessary however for the compiler of the working party tables, unless he has abundant time, to detail *minor* tools; this duty may be left to the storekeeper, who will of course have a detail of the working parties. It will be the business of this official to allot these tools fairly. If they are to be had, they will be issued to the parties in due proportion.

A distinction has been made between "principal" and "minor" tools. The distinction lies in this :—*principal* tools are those without which it is impossible to execute the work; *minor* tools are those which can, at some inconvenience, be dispensed with.

Digitized by Google

Under the denomination "*principal*" tools are included :—

For entrenchments.—Pickaxes ... ... $\frac{1}{2}$* to 1 per man.
Shovels ... ... 1 ,, ,,

If the front slope of the parapet is to be sodded—
Spades ... ... $\frac{1}{3}$,, ,,

(If entrenching tools are to be double-manned, half these numbers are needed).

For clearances.—Felling axes, hand axes, billhooks, cross-cut saws and hand saws may be classed together as "cutting tools." One per man will generally be detailed, and the storekeeper and executive officer should settle between them which kinds are required, which will depend on the nature of the timber and the quantities of tools in store. If the party has to cart the material after clearing it, a proportion of the men, varying from $\frac{1}{8}$ to $\frac{1}{3}$, will need no tools. In such cases some lashings should be issued for loading and the transport should be noted in the column of remarks.

If buildings or walls have to be knocked down without explosives, it will usually be done with improvised levers. Some heavy hammers will be useful.

For demolitions with explosives... Pickaxes, shovels, augers, saws, hammers, and lashings are the chief tools used. The work is always in the hands of an experienced officer, who details his tools.

For wire entanglements ...	Cutting tools (billhooks preferred)	$\frac{1}{3}$ per man.	
	Pliers	$\frac{1}{5}$,, ,,	
	Mauls	$\frac{1}{10}$ for L.W.E. / $\frac{1}{5}$ for H.W.E.	per man.
For abatis	Cutting tools ...	$\frac{2}{3}$ per man.	
	Mauls	$\frac{1}{10}$,, ,,	
	Pickaxes	$\frac{1}{5}$,, ,,	
	Shovels	$\frac{1}{5}$,, ,,	
For revetments and loopholes—			
(*a*). *Sandbag*	Shovels	$\frac{1}{5}$,, ,,	
(*b*). *Sod*	Spades	$\frac{1}{2}$,, ,,	
(*c*). *Brushwood*	Cutting tools ...	$\frac{1}{2}$,, ,,	
	Mauls	$\frac{1}{5}$,, ,,	
(*d*). *Plank*	Hammers ...	$\frac{1}{2}$,, ,,	
	Saws	$\frac{1}{2}$,, ,,	
For defending walls and buildings	Pickaxes ... ... / Crowbars ... ... / Cutting tools ...	1 of sorts per man.	
For overhead cover (exclusive of placing the top covering of earth or sods)	Mauls	$\frac{1}{5}$ per man.	
	Pliers	$\frac{1}{5}$,, ,,	
	Cutting tools ...	$\frac{1}{2}$,, ,,	

* According to the nature of the soil.

Digitized by Google

Under the denomination "*minor*" tools are included:—

For entrenchments	...	... Rods, tapes, mallets and field levels.
For clearances ...	...	... Grindstones, whetstones, gloves and ropes.
For defending walls and buildings ...	...	... Carpenters' tools for erecting platforms, making barricades, etc.

and so on for other kinds of work.

Of course special jobs, such as blockhouses or bridges, would have to be considered in greater detail; but such work would be put into the hands of an experienced officer, who would prepare his own list of tools.

As regards material, *i.e.* expendable stores. Column 8 will state generally the *kind* of material needed, where it will be obtained and whether the working party are to fetch it or whether it will be brought to them. In the former case transport will be noted in the column of remarks.

In a few cases, mentioned below, *quantity* also must be shown.

The following will be the materials usually referred to:—

For Entrenchments.—*Nil.* (But see loopholes and overhead cover below).

For Clearances.—*Nil.*

For Demolitions with Explosives.—The *quantity* of the main explosive used. The minor materials for demolitions, viz., matches, fuze, detonators, primers, twine, planking, nails, sandbags, etc., must be arranged for by the executive officer.

For Wire Entanglements.—Quantity of wire and where the pickets can be cut. (One foot-run of wire is required per square foot of low entanglement and one yard-run per square foot of high entanglement).

For Abatis.—Where the trees will be got. If the abatis is to be wired, a good rough rule is to provide five times as much length of wire as the length of the abatis.

For Revetments and Loopholes.—

(*a*). *Sandbag.*—*Quantity* of sandbags. (About 13 per loophole in earth and 2 per square foot of revetment).

(*b*). *Sod.*—*Nil.*

(*c*). *Brushwood.*—Where the brushwood is to be got.*

(*d*). *Plank.*—*Quantity* required. (For loopholes, 12 square feet per loophole in earth).

For Defending Buildings.—*Nil.* (There will generally be plenty of material on the spot).

For Overhead Cover.—Where the brushwood will be got.

Finally Columns 1 and 4 will be filled in.

* One G.S. wagon load of brushwood will cover from 60 to 80 square feet of trench, and will revet 350 square feet of parapet.

Digitized by Google

Each succeeding relief is dealt with in the same way. It is always sound, in the case of entrenchments and obstacles, to start along the whole line at once with the first relief, deepening the trench and widening the obstacle with succeeding reliefs.

Such then is the method here proposed for organizing the work of the defence. The unwelcome arithmetical prospect which it presents is unfortunately inseparable from the subject; for military engineering is largely a matter of figures. Those who devote exclusive attention to the tactical problems of defence, where every man can claim the right of private judgment, may find that they are building, if not castles, at least parapets in the air. They are in fact likely to discover, as the Americans say, that they have bitten off more than they can chew. And finally if they are not so adept at this the less imaginative, though equally important branch of the subject, valuable time will be lost through the misapplication of the labour at their disposal.

Digitized by Google

Rates of Work.

Notes.—The rates given are exclusive of fetching material, except where stated.
For skilled labour (R.E. or trained civilians) increase the rates by one-half.

Nature of Work.	Unit.	Quantity per M.H. (Untrained Men).	Remarks.
Excavation (heavy tools, ordinary soil).	Cubic ft.	30 in 1 80 in 4 reduce rate if using longer reliefs than 4 hours.	Apply factors modifying the rate as follows :— Very easy soil $\frac{3}{2}$, Light tools $\frac{1}{1}$. Difficult ,, $\frac{3}{4}$, Double-manning $\frac{3}{4}$. Stony $\frac{1}{2}$, If parapet is concealed and trench drained $\frac{3}{4}$. If trench is traversed and recessed $\frac{3}{4}$.
Cutting down trees (up to 12" diameter).	—	1 man per minute per inch diameter.	Above 12" diameter the time in *hours* = $\frac{1}{8}$ diameter cubed (in feet).
Cut down small fir wood or brushwood, or mixed.	Sq. yds.	25	Reduce the rate if reliefs are longer than 4 hours.
Ditto, including sorting, binding and carting.	,,	10	Ditto.
Make a fascine	No.	$\frac{1}{8}$	These rates can be increased by 50 per cent. after a little practice.
,, a gabion	,,	$\frac{1}{6}$	
,, hurdles (of any size)	Sq. ft.	$1\frac{1}{2}$	
Sandbag revetment (including filling and tying bags and carrying, say 20 yds).	,,	6	—
Sod revetment (including cutting sods and carrying).	,,	4	—
Brushwood or plank revetment.	,,	35	Includes fetching brushwood from the *heap*.
Clearing strong hedge	Yds.-run	8	—
Building overhead cover ...	Sq. ft.	9	Varies greatly with difficulty of propping, span, etc.; double row support trenches take longer proportionally than single row.
Sod, plank, or sandbag loophole.	No.	$1\frac{1}{3}$	Carpenters can make timber loopholes 3' long at the rate of 4 an hour.
Brickwork loophole in wall	,,	2	Notches take $\frac{1}{3}$ as long.
Stockade.....	Ft.-run	$\frac{1}{2}$	Varies greatly.
Abatis (small trees) single row.	Yd.-run	$\frac{1}{2}$	—
High wire entanglement ...	Sq. yds.	3	Half these rates, if barbed wire is used.
Low ,, ,,	,,	10	

The above rates are founded on experiments in peace and under reasonably good working conditions. An officer will be well advised to reduce the rates on service by at least 20 per cent.

Digitized by Google

MAJOR-GENERAL SIR WILLIAM REID, R.E., G.C.M.G., K.C.B., F.R.S.

(Continued).

By Col. Robt. H. Vetch, c.b., late R.E.

Major Reid had been appointed Adjutant of the Royal Sappers and Miners at Woolwich in April, 1816, and, with the exception of three months when he was away with the fleet on the expedition to Algiers, continued to be Adjutant of that corps either at Woolwich, or Chatham, until July, 1824.

His uncle, Peter Fyers, at the same time held the appointment of Lieut.-Colonel Commanding the Rocket Brigade of the Royal Artillery at Woolwich, and Reid was able to see a good deal of his uncle and aunt, both while he was at Woolwich and later when he was moved to Chatham.

It will be remembered by those who have read the earlier part of the paper on "The Fyers Family," that Colonel Peter Fyers married, in 1812, Frances Bolland (b. 1791), daughter of John Bolland, Esq., M.P., a merchant of Mark Lane, and of his wife Elizabeth, daughter of Mr. Gipps of Hythe, Kent, and Howletts, near Canterbury, and M.P. for Ripon. Mr. John Bolland's family consisted of one son, who died unmarried, and seven daughters. There were, however, at this time only two daughters out of the seven still unmarried and living at home. Three had married before Colonel Peter Fyers came on the scene: Anne, in 1797, to Mr. George Field; Kate, in 1804, to the Rev. Herbert Oakley, D.D.; Elizabeth, in 1810, to her cousin William Bolland, afterwards Sir William Bolland, Baron of the Exchequer; then two years later Colonel Peter Fyers had married Frances; and, in 1815, Sophia married the Rev. John Lonsdale, afterwards Bishop of Lichfield.

Mr. J. Bolland and his family lived at Clapham, which was at that time a favourite place of residence, combining the advantages of country with proximity to the City and Westminster. It was then quite a country village within a short drive of town. Major Reid became a welcome visitor to his aunt's relatives at Clapham and it was not long before he lost his heart to one of the remaining daughters of the house. Miss Sarah Bolland, the youngest but one, was born on the 16th October, 1795, and at this time must have been a singularly

Digitized by Google

attractive young lady. A description of her as she appeared in November, 1816, just two years before her marriage, when she was on a visit to Edinburgh, is given in a letter from Mrs. Grant of Laggan to her friend Mrs. Rucker at Bath. It appears in the "Memoirs and Correspondence" of Mrs. Grant published by Longmans in 1845. The following is an extract from the letter dated Edinburgh, 30th November, 1816 :—

"I ventured out in a chair last night to Mrs. Miller's, where I met a very pleasant select party and of moderate size.

"There was in particular a Miss Bolland, who is on a visit to Sir William Fettes.

"I have very much lost the wish of seeing strangers, but she is one that I think none can see without a wish to meet her again.

"She has, in the first place, a very fine person, with much unconscious dignity in her air and aspect, a countenance noble and almost beautiful: mental in no common degree; and illuminated by large black liquid eyes, full of thought and feeling. She is very intelligent and quite natural, admires fine scenery and elegant literature without the least affected rapture; in short, I have not of long seen anyone that pleased me half as well."

From another source we learn that Miss Sarah Bolland "proved a devoted wife of great wit and beauty." The marriage took place at Holy Trinity Parish Church, Clapham, on the 5th November, 1818, the Rev. J. G. Bolland, Rector of Fetcham, Surrey, officiating.

The British Army of Occupation in France was gradually reduced in 1817 and 1818 and was altogether withdrawn at the end of the latter year. In 1817 many companies of the Royal Sappers and Miners were brought away and that corps was in consequence largely reduced and the adjutancy was moved to Chatham.

It was to Chatham that Reid took his bride and they lived in quarters at Brompton Barracks. Shortly after her arrival there, a reduction of the Royal Engineers took place and Reid, being a junior captain, was among the officers who were placed on half-pay on the 1st February, 1819. Fortunately his services were not lost to the State. He was continued in his appointment of Adjutant of the Royal Sappers and Miners, although on half-pay in his own corps.

During the next four years and a-half that he held this appointment at Chatham, he was Colonel Pasley's right-hand man. He threw himself with all his energy into Pasley's plans of instructing and training the men so that they might become not only smart soldiers, but good artizans, with a sound general knowledge of their duties as Sappers and Miners.

It is noticeable that about this period the officers of Royal Engi-

Digitized by Google

neers stationed at Chatham were, for the most part, men more than usually anxious to acquire scientific knowledge in many different subjects. Inventions, experiments, chemistry, geology, for which they took walking tours, improvements in pontoons, bridging and mining, not only occupied their attention, but were studied with enthusiasm. Yet they were by no means bookworms. Sport, and walking and riding exercise are constantly referred to in contemporary diaries. The bachelors of the time must, however, have been endowed with exceptionally good constitutions, for these same memoirs tell of parties in one another's quarters when they sat up till 3 or 4 in the morning playing cards and drinking punch.

While Reid was Adjutant of the Royal Sappers and Miners at Chatham four children were born to him. His eldest child Frances, or Fanny, was born in Brompton Barracks on the 5th August, 1819, but she died the following February; the second daughter was born in their quarters on the 3rd November, 1820, Lucy Alexandrina; a third was born at Woolwich on the 5th December, 1822, and named Maria; and a fourth, Sophia Lonsdale, was born at Brompton, Chatham, on the 9th January, 1824.

In 1823 Reid published two little works which were the result of his experiences in the Peninsular War. One was *The Defence of Fortresses* and the other *The Defence of Towns and Villages*. In the same year he also published translations of two French books, which he thought might be useful to his brother officers. These were *The Instructions issued by the French Imperial Minister of War for the Defence of Fortresses in 1813*; and *Instructions issued by the French Minister of War for the Defence and the Destruction of Bridges in 1814*.

Reid was restored to the full-pay list on the 24th March, 1824. He appears to have paid a visit to Dublin about this time. His uncle, Lieut.-General William Fyers, was still alive and Commanding Royal Engineer in Ireland, and no doubt it was in consultation with him that he applied to be allowed to join the Trigonometrical Survey of that country then in contemplation, and for which a Bill had been brought into the House of Commons.

In the following June the Committee of the House, to which the Bill had been referred, recommended that a trigonometrical survey of Ireland should be made with the view of apportioning equally the local burdens, and of obtaining a general valuation of the whole country. The Bill became law, and Colonel Thomas Colby, R.E., was appointed to superintend the work.

On the 24th July Major Reid was named to assist him and, resigning his adjutancy, he proceeded to Dublin. As it was intended that the survey should be conducted by the Royal Engineers under the Board of Ordnance, Reid suggested to Colby the advantage that

Digitized by Google

would be derived from utilizing the Royal Sappers and Miners in carrying out the subordinate details of the survey. After a lengthy correspondence, lasting over six weeks, Colby was convinced that the proposal was not only a practical one, giving a benefit to the Sappers by survey practice in the field, but would be also an economical way of carrying on the work. Accordingly he put forward the proposal to the Master-General of the Ordnance, then the Duke of Wellington. On the 12th December, 1824, a Royal Warrant was issued for the formation of a company of 62 non-commissioned officers and men for employment in the survey of Ireland. Reid was appointed to command the first Survey Company, which was numbered the 13th Company of the Royal Sappers and Miners.

The company was at once organized at Chatham. The men were selected from the most intelligent men at the station, and were specially trained under Colonel Pasley for the particular duties they would be called upon to perform. The first detachment of the company, consisting of 21 rank and file under Lieut. E. Vicars, R.E., arrived in Dublin in March, 1825, and the remainder of the company followed in April. The men were distributed in small sections over the North of Ireland—at Antrim, Belfast, Coleraine, Dungiven, and Londonderry, etc.

Reid lived with his family at Engineer House, Island Bridge, at first, but, when the company arrived, he went to live in the house at Mountjoy Barracks, in the Phœnix Park, where the headquarters of the company were quartered ; he remained there three years from April, 1825, until June, 1828. There his only son, Edward Hay, was born on 20th October, 1825, and there he died 10 months later. There also his fifth daughter, Elizabeth Oakeley, was born on the 5th November, 1827. Reid travelled about the country as his work required, but all the map drawing was done at Mountjoy.

He remained on the Ordnance Survey in Ireland until June, 1828, and was then placed on the unemployed list for six months. He returned to England and stayed in London and Chatham until October when he occupied his father-in-law's house at Clapham for three months. He was promoted to be 1st Captain on the 28th January, 1829, and sent to Exeter, then the headquarters of the Western Engineer District, where he remained for nearly three years. During this time serious disturbances occurred in S. Wales and districts round Bristol, and Reid took part in the military arrangements for quelling the riots.

His duties carried him all over South Wales; he had to visit all works of defence and barracks in the counties of Somerset, Gloucester, Hereford, Monmouth and Worcester; and his time was much occupied in travelling. The only personal glimpse

Digitized by Google

which we get of Reid, during all the years that had gone by since his war services ceased, is found in the solitary letter that has been preserved which was written from Exeter to his friend Colonel Pasley.

From Major Reid to Colonel Pasley, R.E.

"EXETER, 10*th June*, 1829.

"MY DEAR COLONEL,

"I was much pleased to find that the packet I had got from you stitched with green cord was all in your own handwriting, and the contents interested me much.

"I have never changed my opinion respecting your geometry and fortification as being the best books for beginners, and I advised Macauley to introduce them, at least the fortification. If they are simple they would be the quicker gone through, and after going through them the cadets could commence, as you say, what Macauley wishes to prepare.

"I know no other elementary book, which deserves to be so called, on fortification. It might perhaps be modified with advantage as Colonel Williams suggested, and as you yourself would approve; but with so clear and simple an introduction to fortification, I think it is a pity that it is rejected at Woolwich for something yet to be prepared and which when produced may not be half so good.

"The Dublin Education Society sent me half-a-dozen copies of their geometry; I wished them to have taken yours as it was, but when they had resolved to ask your permission to compile from it instead, I thought it no use to say anything on the subject. I don't like theirs as well as your first edition, nor is it so well suited for schools.

"I think it is a pity that classics are not required to be read before the cadets come to Woolwich, at least a moderate share.

"Indeed, I have no doubt but that the labours of your committee will be very valuable.

"Like you I have melted my silver crucible; I am recommencing a few chemical amusements and mean to send you my results from time to time. I now procure the silica in complete solution, not in the semi-fluid glutinous state I got it to at Chatham. I believe that we failed principally from not using materials sufficiently pure and always distilled water. Great chemical changes take place by the addition of so very little new matter that pure ingredients are absolutely necessary. I found common coal and even gas coke to injure seriously the platinum capsule by giving out to it different oxides which combined with it. I partly oxidized the platinum by not cleaning off my mortar with an acid, after having had potash in it, though I scrubbed it with a cloth.

"Farraday's *Manipulation* I find an excellent book. I have used his method of applying india-rubber for lutes and corks successfully, and I have sent to London for some sheet caoutchouc recommended by him.

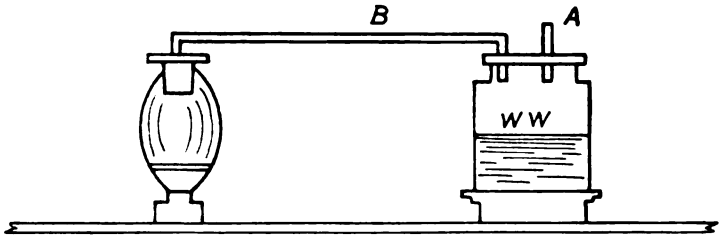
Digitized by Google

"We have had a very good lecturer here who is gone to Plymouth, and would go to Chatham. He is a candidate for the Chemical Lectureship at the London King's College. His terms are, I believe, 35 guineas for a course of twelve lectures, and his address is at Mrs. Ridd's, Portland House, Hull.

"He was engaged by the Mechanics' Institution here for a fixed sum, and all that was got beyond that was gain to the Institution.

"I find the chemistry an agreeable and useful amusement and I hope I shall pursue it.

"I burnt myself once with the Fluo Silica acid: but after preparing a better apparatus I succeeded in precipitating the silica very easily.



"The tube A became a safety valve; the one B just went through the cork; WW was the height of the water. The gas was decomposed and is well described by Turner; on touching the water it formed film after film on the surface and then fell to the bottom. This is the hydrate of silicate which must get a red heat, mine was pure white. I find that thin glass tubes are bent by the heat of the spirit lamp without the blowpipe, and they are of great use and frequent application.

"I sent Matson a box of stones with a smaller one inside for Miss Pasley; some of which may amuse you though they are of very little value.

"I am glad that chemistry and geology are to be taught at Woolwich on a rational system.

"Mrs. Reid has written to Mrs. Pasley, I hope she is pretty well.

"Pray tell Hay that I reproach myself for not writing to him, we hope to see him.

"Mrs. Reid intends to go to Brecon with me. We shall be back by the 12th or 15th July at Exeter.

LONDON, *Friday, 13th June*, 1829.

"I had written thus far at Exeter when I heard of Mr. Bolland's death and I have come up to London to attend his funeral; after it I return immediately.

"He was 86 and had nothing to live for, both body and mind being decayed after having been both of them unusually vigorous until nearly 80.

Digitized by Google

"I have been to Newman's and made a few small purchases, and should like to take a look into your vestry at Brompton but return to Devonshire on Tuesday. Newman told me that Mr. Murray, whom I mentioned as a lecturer, had got into debt in London and lost his credit; that he knew him very well. His language is absurdly fine, but if you ever get anyone to come to Chatham I would recommend him to your consideration.

"I continue to teach my little girls in whom I take great pleasure.

"Our eldest is greatly pleased at demonstrating the truth of the first part of your geometry. It shows her at the same time the application of Euclid, the first four books of which she knows pretty well.

"Another amusement we have is filling a border in the garden with the numerous pretty native plants which abound in the hedgerows in Devonshire, and we plant them arranging them at the same time in the Linnæus system. It is a nice occupation I think for little girls, and a healthy one, and adds much interest both to their walks and mine. It is teaching them the first principles of botany correctly.

"I shall tell you how our garden gets on also. I must now conclude.

"Yours sincerely,

"Wm. Reid.

"They dance every day. It is of great value. Young women don't in general take exercise enough."

Reid spent more than two years after this letter was written at Exeter. On the 14th September, 1831, he was placed under orders for foreign service, his destination being the West Indies and, obtaining leave of absence, he went to stay at Plymouth to prepare for the voyage.

On the 8th December, 1831, he embarked with his family for Barbados where he arrived on the 12th February, 1832. He lived in the Quarter for the Resident Engineer, as the second in command was called, at St. Ann's. The island had been visited by a fearful hurricane on the night of the 10th August, 1831, and the results had been even more destructive than the great storms of 1675 and 1780. The loss of life was estimated at 1,500 and the injured numbered nearly 5,000.. The value of private property destroyed, exclusive of the shipping, was reckoned at a million and a-half sterling. One of Reid's duties, immediately after his arrival, was the rebuilding of various Government buildings which had been blown down in the hurricane, and the blowing up of the *Arethusa*, a Liverpool vessel of 350 tons, which had foundered in the hurricane and had become dangerous to the navigation of the roadstead in Carlisle Bay. Major Reid commanded the 19th Company of Royal Sappers and Miners at Barbados and he considered that the destruc-

Digitized by Google

tion of this wreck afforded an excellent opportunity for teaching his men practical demolition under water. A number of successive small charges of gunpowder were placed under the ship's bottom along the keel and as near to it as possible; these charges were successfully exploded, and Reid was the first to blow up a wreck by submarine mines. Some years later his friend Colonel Pasley followed his lead and blew up the wreck of the *Royal George* at Spithead. This ship of war of the line had lain there since that fatal day, the 29th of August, 1782,

> "When Kempenfelt went down,
> With twice four hundred men."

The difference between the demolition of the *Arethusa* and of the *Royal George* was that in "the forties" Pasley for the first time used electricity to explode charges; whereas, when Reid blew up the *Arethusa* in the "thirties" he had not this novel and valuable help, but nevertheless, as the saying is, he established a record in 1832.

But after all it was the hurricane itself, much more than taking measures to remedy the destruction it had caused, which occupied Reid's mind at this time. The devastation and misery he witnessed led him, as he himself says: "to search everywhere for accounts of previous storms in the hope of learning something of their causes and mode of action." In his researches he was materially assisted by the previous labours of Mr. Redfield of New York, who, in the previous year (1831), had published in the *American Journal of Science*, the first of a series of papers in which he argued, not only that the hurricanes of the American coast were whirlwinds, but that they were progressive and moved in curved tracks with a considerable velocity.

Reid found himself in complete agreement with Mr. Redfield's theories and, fully acknowledging his obligations to that meteorologist, he set himself to confirm and extend his deductions by laboriously collating the log books of British men-of-war and merchantmen. Impressed also with the idea that to the south of the equator, in accordance with the regularity evinced in all natural law, storms would be found to move in a directly contrary direction to that in which they moved in the Northern Hemisphere he collected all the facts available to aid further enquiry on the subject.

From October, 1833, to January, 1834, Reid was the Engineer officer in St. Vincent where he and his family lived in the Engineer Quarter. Then in January, 1834, he returned to Barbados and occupied the quarter he had been in before for the remaining few months of his period of foreign service.

Digitized by Google

Reid arrived home from Barbados in May, 1834. The congestion in the upper ranks of the Artillery and Engineers was still great. Many officers were unemployed, and as there was no vacancy for Reid to fill he had to join this number. While he was thus officially unemployed he was a very busy man. After a month in London he spent four months on the Continent and a month at St. Leonards and then took a house at Hampstead. He was not sorry to have complete leisure for a time and to be able, in a way he could not do in the midst of his military duties in the West Indies, to devote himself to the subject of discovering the laws that govern storms. For the next year he was engrossed with his investigations, shifting evidence, weighing opposing statements in the balance of his judgment, and studying every feature of the phenomena. But while he was so absorbed, events were happening in Spain which led to an abrupt, albeit temporary, suspension of his labours.

On the death of Ferdinand VII. in 1833, his widow, Queen Christina, assumed the regency of Spain during the minority of her daughter, Isabella II. Don Carlos claimed the throne and in July, 1834, appeared in Spain to support his claim. This caused no small stir in this country. England had successfully turned Joseph Buonaparte out of Spain and placed Ferdinand on the throne to which he was entitled. This same title was now disputed in the person of his daughter.

Lord Melbourne's ministry gave way that summer to that of Sir Robert Peel. The Duke of Wellington, who was Foreign Minister, was opposed to any intervention in Spanish affairs and in spite of a good deal of sentiment in favour of the Queen Regent and the legitimate heiress to the throne, no official support was offered from this country in the shape of armed intervention.

In April, 1835, Lord Melbourne returned to power with Lord Palmerston as his Foreign Minister. The latter was strongly in favour of lending Spain armed support and of redeeming the pledges which England had given in common with France and Portugal, when Isabella II. was recognized as the rightful successor to Ferdinand VII. by the Quadruple Treaty of the 22nd April, 1834. But to have sent a British army to Spain would probably have brought about the downfall of Lord Melbourne's government. It was decided therefore to render assistance in other ways. An Auxiliary Force, to be composed of several foreign legions of volunteers, was to be formed, at the instigation of the Spanish ambassador in London and sent to the assistance of Spain.

As Alasa, the Spanish ambassador, was a friend of the Duke of Wellington, having had the unique experience of serving against Nelson at Trafalgar and with Wellington in the Peninsula and at Waterloo, the opposition was not likely to take serious objection to

Digitized by Google

the proposal. Alasa settled matters personally with Palmerston. The British Legion of Volunteers was to be a force of 10,000 men of all arms raised for service in Spain. Lieut.-Colonel (afterwards Sir) George de Lacey Evans was appointed to the chief command. The Foreign Enlistment Act was suspended and by the summer of 1835 the enlistment had been fairly successful.

It is true that there was much difference of opinion as to the wisdom of the policy. King William IV. was strongly opposed to it and to the appointment of Evans to command the British Legion. Don Carlos took great umbrage and issued a proclamation protesting against the semi-official interference in Spanish affairs of British and other foreign volunteers, and ordering that no quarter should be given in the field to any foreign volunteer auxiliaries.

British officers on full pay desiring to serve in the British Legion had to obtain permission to be placed on the Half-pay List with a view to receiving a commission in the Legion.

Lieut.-Colonel George de Lacey Evans had served with distinction with Wellington in the Peninsula and at Waterloo. He had also served in the American War of 1814 at Washington, Baltimore, and New Orleans, where he was wounded. He had no doubt seen something of Reid both with the Light Division in the Peninsula and afterward at New Orleans, and had formed a high opinion of his ability as a leader of light troops. He therefore offered Major Reid the command of the Light Infantry Brigade of the Legion.

Reid had been employed since April, 1835, as the resident Engineer officer at Weedon, but the offer of this command of a light infantry brigade appealed strangely to him. The old war spirit which had been laid to rest for close on 20 years awoke within him. Spain for which he had fought and bled, and where he had gained the laurels with which he had never yet been crowned, called to him. Bright recollections of his youthful days in that sunny climate stirred within him. To fight for the young daughter of the King he had then helped to restore to his throne, was to him, the practical soldier and scientist, an irresistible claim. Confidence in his own powers of command in the field and of the fascination of light infantry work added its spell. He accepted the offer and went to Spain in September, 1835, leaving his wife and family at Brighton. He was gazetted to the temporary Half-pay List on the 7th of that month. At the same time a very talented officer of artillery, Capt. Colquhoun, who had served in the Peninsular War, accepted the command of the British Legion Artillery, and was also gazetted to the temporary Half-pay List.

Over these two officers a fierce paper war was waged. The Artillery and Engineers being under the Board of Ordnance had different regulations from those applying to the rest of the Army as regarded half-pay. The General Commanding-in-Chief, at that time

Digitized by Google

Lord Hill, better known as Sir Rowland Hill of Peninsular fame, had laid it down that officers on full pay could not serve with the Legion, but that officers on half-pay would be allowed to do so. Nevertheless an officer in the cavalry and infantry on full pay could, if eligible, be placed on half-pay in order to join the Legion, and returning when he wished to do so, could be brought back to full pay in any regiment that might be available. There was no arrangement in the Ordnance Corps at that time by which an officer of Artillery or Engineers who was voluntarily placed on half-pay could be brought back to resume his place in his regiment or corps.

The Master-General of the Ordnance, Lieut.-General Sir Richard Hussey Vivian, Bart. (afterwards Lord Vivian), K.C.B., who was a cavalry man, had known Reid in the Peninsula. Vivian then commanded a light cavalry brigade and Reid was a lieutenant but senior Engineer officer in the same light division. Vivian had no doubt formed an high opinion of Reid and was glad to further his views. He also was friendly to de Lacey Evans and was pleased to do what he could to help the Legion to be a success. When the question arose how these two officers, Reid of the R.E. and Colquhoun of the R.A., were to be enabled to serve in the positions in the Legion that had been offered to them and yet be able after serving in Spain to resume their places in their respective corps, it was urged by Lord Palmerston that they should be put upon temporary half-pay. The Master-General was sympathetic and agreed, but pointed out that no such thing existed for the Ordnance Corps and that the King's sanction must be obtained. Sir Hussey went away from town on inspection duty and through some misunderstanding the King's pleasure was not taken by Lord Palmerston. His Majesty approved the appointments without noticing the new departure. When it was brought to His Majesty's notice there was trouble.

The correspondence is in the Record Office, and since it is mainly about poor innocent Reid who saw himself gazetted and went to Spain believing he went with the King's approval, and found himself the victim, not for the first time in his life, of the errors of others, I am including the correspondence, a copy of which has been lent me, in this memoir. Before however giving this somewhat amusing and rather lengthy correspondence between well-known Statesmen and the Private Secretary of the Sovereign about Major Reid and Capt. Colquhoun I will continue the narrative.

The King, hostile to the Legion and worked upon by enemies of Lieut.-Colonel de Lacey Evans, took exception to the arrangement made and ordered that it should be cancelled, and that Major Reid and Capt. Colquhoun should be informed that, if they continued in the service of Spain, His Majesty would never consent to their being restored to full pay and resuming their places in their regiment or corps.

Digitized by Google

Reid had already arrived in Spain and assumed his command when, like a pistol put to his head, came the King's commands that he should either at once return to his corps or that he should be cast out of it for ever. He knew nothing of the correspondence that had taken place, of the mistake that had been made. He only knew that, whereas he had specially applied for the King's permission to be allowed to accept the command in the Legion on the terms and conditions offered, he had found himself gazetted to the temporary Half-pay List as he anticipated. He had proceeded to Spain under the impression that the King not only approved of his going but also of the arrangement made for bringing him back to the Corps when his engagement to Spain was over. Now he had to face the alternative of breaking his engagement with Spain or of leaving the Corps he loved. With that shrewd judgment he showed in difficulties he did not hesitate. To the first his honour was engaged, the second was a severe punishment for no fault of his own, but it must be borne. It was a case of Hobson's choice, there was no alternative.

Actually at the head of his brigade in the field he could not under any consideration leave it, and yet he saw himself, a married man with a family, cut off from his profession, and having to begin life afresh at 44 years of age. He wrote that he felt himself to be personally pledged and, as he could not in honour leave, he must reluctantly accept the consequence of remaining.

In the November following two things happened which greatly relieved his mind and strangely both at Brighton. On the 3rd November the King, who was at Brighton, relented and approved of the original arrangement, on the understanding that it should not be made a precedent. On the 21st of the month his sixth daughter, Charlotte Cuyler, was born at New Steyne, Brighton, and the welcome news was despatched to him that mother and child were both going on well.

I do not propose to dwell upon Reid's active service in the British Legion in Spain at any length. He saw a good deal of fighting, but this war was very different from the war with the French. If the enemy were greatly inferior as soldiers to the French armies of Napoleon and his marshals the men of the Auxiliary Force were as much inferior to Wellington's men. Many of them had no stamina and were quite unfit for hard active service. Reid did his best with the Light Brigade and it did him credit. He took it to the Siege of Bilbao in November, 1835, and early in 1836 he co-operated with Espartero in the attack on Arlaban. In May of that year he assisted in raising the Siege of St. Sebastian. On that occasion the death roll was heavy; 97 officers and 500 men were lost out of a force of 5,000. Reid was wounded in the neck while attacking the lines in front of the fortress. It is a curious coincidence that 23 years before

Digitized by Google

he was wounded in the neck at the siege of this very fortress in storming a breach. At the end of May and beginning of June, 1836, he took part in the repulse of the Carlists who had made a desperate attack on the position of Sir de Lacey Evans. For his services under the Queen of Spain he received the Spanish medal for the Carlist War and was decorated with the Spanish Order of St. Ferdinand.

Reid returned to England in August and on the 19th of that month was restored to the full-pay list. He was not, however, employed owing to there being no vacancy. He resided with his family at Brighton first and then at Blackheath. On the 10th January, 1837, he was promoted Brevet Lieut.-Colonel and on the 17th of the following month was sent to Portsmouth. There he did duty living in the Engineer Quarter at Portsmouth until the 14th November, 1838, when he was again unemployed and went to London. But the year 1838 was the year of his triumph. In this year the results of his many years of scientific research were published by John Weale, of Holborn, in an 8vo. volume entitled, *An Attempt to Develop the Law of Storms by Means of Facts, arranged according to Place and Time, and hence to Point Out a Cause for the Variable Winds.* This volume was illustrated by charts and woodcuts. A second edition with additions was published in 1841, and a third in 1850.

Of this work Major-General Sir John Henry Lefroy, R.A., F.R.S., one of the most careful and exact observers of magnetic phenomena, whose method of observation has been universally recognized as the ideal standard for all work of its kind, says in the *Proceedings of the Royal Society :*

"None but those who have attempted a like task can fully appreciate its difficulties :—observations which the investigator dare not reject, although convinced that they are wrong; provoking silence where a word would clear up a doubt; still more provoking record of useless details, to the omission of those that are important. Nevertheless, Reid persevered and, gaining confidence in the key he had obtained to the real nature of these intricate phenomena, he ventured, in 1838, to lay down, for the guidance of the seaman, those broad general rules of navigation which are known as the 'Law of Storms.' He showed that it is possible to deduce from the facts, rules applicable to every emergency; to tell unerringly when ships must run before the hurricane, when they must lie to, and on which tack, so as to avoid being taken aback by the veering of the wind; lastly, how to anticipate its coming changes, and shape the course which best turns them to account. The announcement of this law, so important to the mariner, and to every naval and commercial nation, was received with the greatest interest by the scientific world: and Lieut.-Colonel Reid's work, entitled 'An Attempt to Develop the Laws of Storms' has gone through several editions and has been translated even into Chinese."

Digitized by Google

If Reid's deeds of glory as a soldier had failed to win for him the recognition which he might have expected, far otherwise was it with the patient investigator of physical law. He was elected a Fellow of the Royal Society in 1839, and, 10 years later, Vice-President. Many learned bodies hastened to enrol him among their numbers and to do honour to his work. Whether it was that his merits were beginning to dawn on the military authorities, or that a lurking feeling that their predecessors had behaved shabbily to Reid in the days that had gone by, at last he was given a Companionship of the Bath on the 19th July, 1838, and the following January was appointed Governor of Bermuda. As his uncle had told him justice would be done to him in the long run; but who can measure the difference that must for ever exist between the prompt acknowledgment of the services of the young and the honours held back to be bestowed when middle age is reached, when the ambitions of youth have faded, the fire has gone out, and duty for duty's sake has taken their place.

(*To be continued*).

Digitized by Google

MEMOIR.

COLONEL HENRY FYERS TURNER, C.B., R.E.

By Col. Robt. H. Vetch, c.b., late R.E.

It is now a considerable time since I was asked to write memoirs for this Journal of two brother officers who died last year. They were Major-General E. R. James and Colonel H. F. Turner. By virtue of their mothers they were both members of the Fyers family, and it was proposed to notice them in due course in the article on that family which has been running its rather lengthy series for some months past. This article has indeed much outgrown my original intention, and the Editor has wisely agreed to place memoirs, it may be desirable to insert, of officers who are members of the Fyers family through the female line, under their own surnames, instead of including them in the general article.

Colonel H. F. Turner was the eldest son of Major-General Henry Austin Turner, Royal Artillery, and of his wife, Renée Theresa Fyers, third daughter of Major-General Thomas Fyers, R.E., and granddaughter of Lieut.-General William Fyers, Colonel Commandant, Royal Engineers. He was born on the 8th November, 1840, at Mauritius, where his father was then serving as a subaltern of Royal Artillery, having married the daughter of the Commanding Royal Engineer there on the 12th February of the same year.

Major-General H. A. Turner, born at Slane, in Ireland, on the 16th November, 1814, was the second son of the Rev. Joseph Turner (1772—1833), D.D., and J.P., Vicar of Duleek, and Rector of Raddenstown, co. Meath, by his wife, Margaret Jane Lhoyd, of Llwydiarth Anglesea. General Turner's great-grandfather was Timothy Turner, of Dublin, who died in 1765.

The writer remembers well General Turner and his wife, when he was in Bermuda in 1861–2. The General was then a lieut.-colonel commanding the artillery in Bermuda, whose headquarters were at St. George's, where there was a joint R.A. and R.E. Mess. Mrs. Turner was a very gentle little lady, rather sad after the loss of many children—three were carried off in an epidemic of yellow fever at Barbados some years before and two others later. As her son was in the writer's batch he received many kind attentions from both Colonel and Mrs. Turner during the short time he was quartered in Bermuda.

Their eldest son, Henry Fyers Turner, or Harry Turner, as he was called by his contemporaries, was not long in Mauritius; on the day

Digitized by Google

he was one year old he embarked with his parents for England in the troopship *Adelaide*. When he was little over eight years old his father was ordered to the West Indies, and sailed in the s.s. *Great Western* in January, 1849, for Barbados, taking his family with him. In the epidemic of yellow fever in Barbados in the autumn of 1852, three out of five children died, and Capt. Turner was sent to Grenada. He returned to England with his family in the s.s. *Vulcan* in January, 1854, when Harry was sent to Dr. Bridgman's School to be prepared for Woolwich. He entered the Royal Military Academy in January, 1856, having passed in November of 1855 the last examination of nominated candidates. Before introducing the new system of public competition open to all, it was decided by the authorities to allow all the nominated candidates who had attained the prescribed age to compete among themselves for the vacancies. If I remember right there were some 120 to 130 of these candidates and there were some 30 vacancies. After two years at the "Shop" Turner got his commission in the Corps on the 23rd December, 1857.

He spent only 10 months under instruction at Chatham and was then sent to Portsmouth. There he was employed on the defence works at Hilsea Lines under Major F. C. Hassard (afterwards a Major-General and C.B.). The Commanding Royal Engineer of the district was the well-known Crimean soldier, Colonel Sir J. W. Gordon, K.C.B. At the end of 1861 the seizure of the Confederate delegates, Messrs. Slidell and Mason, on board the Royal Mail steamer *Trent* by Capt. Wilkes, commanding the Federal warship *San Jacinto*, made a war with the United States of America imminent. Immediate action was taken by sending a large force to Canada. Sir J. W. Gordon was sent in command of the Engineers, and Turner accompanied him. Before he left Portsmouth Major Hassard wrote the following letter to the C.R.E. showing how well Turner had done his work at Hilsea :—

"ROYAL ENGINEER OFFICE,
"HILSEA, *3rd December*, 1861.

"SIR,

"Lieut. Henry Fyers Turner, R.E., having been ordered to proceed forthwith to Canada I should be neglecting my duty did I not bring to your notice the great zeal and ability which this officer has evinced during the three years that he has been employed at Hilsea. He has had duties to perform both onerous and of great responsibility which he has done to my entire satisfaction. He is an officer of much promise and likely to prove an honour to the Corps to which he belongs.

"I have, etc.,
"F. C. HASSARD,
"*Major, R.E.*

"To COLONEL J. W. GORDON, C.B., A.D.C.,
"Commanding Royal Engineer,
"Portsmouth."

Digitized by Google

"Forwarded to the D.A.G. of Engineers.

"It gives me great pleasure to confirm and to forward this report of Lieut. Turner's good services.

"J. W. GORDON, *C.R.E.*"

When Messrs. Slidell and Mason were surrendered to the British Government on 1st January, 1862, most of the troops so hurriedly sent to Canada were recalled, but Turner, being due for foreign service, was sent to Toronto, where he remained for the next five years.

On 7th September, 1864, he was married at St. John's Church, Toronto, to Harriet Eliza Spragge, eldest daughter of the Hon. John Godfrey Spragge, Vice Chancellor (afterwards Chief Justice) of the Province of Ontario.

In 1866 the Fenians in the United States held a great mass meeting in New York on the 4th March in sympathy with the disaffection in Ireland. At this meeting the invasion of Canada was threatened, and on the 31st May the threat was carried into execution by Colonel O'Neil, who, with a large body of Fenians, crossed the Niagara and entered Canada; conflicts ensued with bloodshed; the Fenians were driven back and many of them were captured by the United States' Generals Grant and Meade.

When this Fenian raid took place Turner was attached to the Flying Column under Colonel R. W. Lowry, commanding the 47th Foot, who had served on the Staff throughout the Crimean War. For his services in this successful little campaign Turner received the medal with clasp "Fenian Raid, 1866." In the middle of June, the affair being practically over, the Commanding Royal Engineer in Canada wrote to enquire when Lieut. Turner would be at liberty to return to his ordinary duties, and what duty he was then employed upon. The following letter from Lieut. Turner in reply shows what was the varied nature of his duties during the repulsion of the raid and after :—

"CAMP FORT ERIE, *15th June*, 1866.

"SIR,

"In accordance with instructions contained in your letter of the 13th instant, calling upon me for a report for the information of the C.R.E. on the duties I am, and have been, employed in, with the view of ascertaining the necessity of my staying here, and of supplying my place at Toronto, I have the honour to report that on the 2nd June, I was directed to join the Flying Column under Colonel Lowry, under orders to proceed with the utmost expedition to intercept the retreat of the Fenian forces on the Niagara frontier.

"I did so, and during the rapid advance and occupation of Fort Erie endeavoured to assist the officer commanding by every means in my power: in establishing the volunteers in their camp; in providing means for the removal of guns, etc., from the trains; by assisting him to receive and answer telegrams, by conveying messages night and day to the different regiments and generally by placing my services at his disposal.

Digitized by Google

"After the camp was established here, I sketched its position and made myself acquainted with the ground in the neighbourhood.

"After the departure of Colonel Wolseley on the 4th instant I was directed to perform the duties of the Quartermaster-General's Department, and have ever since made all arrangements connected with the conveyance of reinforcements, and then stores to the various out-stations under Colonel Lowry's command, etc.

"To-day I visited with him Fort Colborne and Dunville.

"As attacks on these places, especially the former, are almost nightly expected, I advised the officers commanding on the position, form, and construction of some rough entrenchments which it seemed advisable to construct with the cord-wood there collected.

"I have assisted in the examination of prisoners and in all the multifarious duties connected with a force in the field.

"As at one time it seemed probable that the column would be called on to make some rapid movements I organized (as reported by telegraph) a small Volunteer Engineer Brigade of 12 men to carry out any repairs to bridges, railroads, etc., etc., which might quickly be required.

"I have caused the entrenching tools brought by various corps to this place to be collected, sorted, and stored ready for use.

"In the absence of any storekeeper I have collected the reserve ammunition from the cars in which it was mixed with other stores, and had it properly stored in safety.

"I am not at present engaged in any strictly professional duties, and am not aware whether my services as an Engineer officer will be further required.

"I have, etc.,
"H. F. TURNER,
"*Lieut., R.E.*"

"Forwarded for information of C.R.E. in Canada. Should there be no further disturbances General Napier will order Lieut. Turner to return to Toronto next week.

"I am glad to say this officer has performed his duties with his usual zeal and ability.

"F. C. HASSARD,
"*Lieut.-Colonel, Dist. C.R.E.*

"*16th June*, 1866."

"R.E. HEADQUARTER OFFICE, MONTREAL, *19th June*, 1866.

"SIR,

"I enclose a report from Lieut. Turner, R.E., giving an account of his proceedings while attached to a Flying Column under Colonel Lowry in the Niagara District during the late inroad of Fenians from the United States, and have much pleasure in adding my testimony to that of his immediate commanding officer as to the manner in which Lieut. Turner discharges the duties entrusted to him.

"I have, etc.,
"CHARLES E. FORD,
"*Colonel, C.R.E. in Canada.*

"The D.A.-General, R.E., Horse Guards."

Digitized by Google

On leaving Canada, in January of the following year, to return to England, his old commanding officer at Hilsea had the pleasure of repeating his former commendation of the services of Lieut. Turner while under his command, in the following terms :—

ROYAL ENGINEER OFFICE, TORONTO, *1st January*, 1867.

"SIR,

"On a former occasion when Lieut. Turner, R.E., quitted my command I had the pleasure of bringing the very satisfactory manner in which he had performed his duties to the notice of the Commanding Royal Engineer of the South Western District. During the second period that Lieut. Turner has served under my immediate command I see no reason to alter the opinion I then formed of him; and have the honour to bring to your notice the great zeal, diligence and intelligence displayed by this officer in the execution of every duty that he has been called upon to perform.

"I need hardly remind you of the favourable mention made of him when attached to the field force at Fort Erie during the Fenian raid, when in addition to his own duties he was employed as Deputy Assistant Quartermaster-General. I trust therefore you may be inclined to bring his name to the notice of the Deputy Adjutant-General of Royal Engineers, as should any important service be required from an officer of the Corps, and he be selected, I am quite certain that Lieut. Turner will always support the high character he has obtained from everyone during the time he has been in the Service, and continue to be a credit to the Corps to which he belongs.

"I have, etc.,

"F. C. HASSARD,

Lieut.-Colonel, C.R.E., 1st Military District.

"D.A.G., R.E.

"Cordially agreeing with Lieut.-Colonel Hassard in all he says in favour of Lieut. Turner, R.E., I have much pleasure in forwarding this report.

"CHARLES E. FORD,

"*Colonel, C.R.E.*

"*4th January*, 1867."

On the 1st April, 1867, Lieut. Turner joined the South Eastern District, and was employed for the next four years at Dover on fortification and barrack work and on company duties. His company was in command of Capt. (afterwards Major-General) J. P. Maquay, R.E., of whom he often spoke in high terms.

From Dover he went in 1871 to the Postal Telegraphs and here it must be explained that in the month of May, 1870, the Royal Engineers were employed for the first time under the Post Office. It had been realized that to have a military telegraph service which should be efficient in time of war, it was necessary to continually exercise it in similar work in time of peace. That a large area of

Digitized by Google

country was required, over which the Engineers should be constantly exercised in peace time in constructing air and underground lines and repairing them, and in manipulation of instruments, and in office work. Fortunately the proposals came at a time when the Post Office was in need of every assistance in coping with new telegraph lines required, and the War Office proposal to place one company of Royal Engineers under the Post Office was welcomed by the Postmaster-General.

The company selected was the 22nd under Capt. (afterwards Major-General) C. E. Webber, R.E., with Lieut. (now Colonel Sir) Herbert Jekyll, and Lieut. (now Capt.) J. Ramsay, as his subalterns. Owing to the pressing necessities of the Post Office for the rapid extension of the telegraph system, an additional company of Royal Engineers, the 34th, was placed at the disposal of the Post Office in the autumn of 1871, and Turner was appointed to command it.

When Turner left Dover to join the Postal Telegraphs he was still a subaltern and joined the 22nd Company under Capt. Webber, doing duty first in London, and then in Edinburgh. On the 12th August, 1871, he got his promotion to 2nd Captain and in the autumn went to Inverness, where the headquarters of the 34th Company were to be.

The total strength of the Royal Engineers at that time under the Post Office was 6 officers and 153 non-commissioned officers and sappers. From a note in the *R.E. Journal* of March, 1872, it would appear that they were employed in the construction of new lines and the reconstruction of old lines, both over and under ground. The mileage constructed and rebuilt in 1871 was over 1,000 line-miles and over 3,200 wire-miles. A few N.C. officers and sappers were employed as clerks in telegraph offices, and others in the maintenance of existing lines and in offices chiefly in the eastern counties, called the Eastern Division, Postal Telegraphs. This division of the country for the employment of the military was extended later to comprise all that portion which lay east of a line drawn from Lynn, through Cambridge, London, and Tonbridge to Beachy Head on the South Coast.

On the 1st April, 1872, Capt. Turner had the misfortune to lose his wife, who died at Inverness. On the 6th July he moved with the headquarters of the 34th Company to Ipswich which was the official centre of the new Eastern Division of the Postal Telegraphs. For nearly six years Capt. Turner remained at Ipswich in charge of this division, doing good work.

In 1877, Major Webber, anxious to have a permanent arrangement and impressed with the necessity of having a large body of skilled telegraphists instructed in time of peace by means of the Post Office service, put forward a scheme to the War Office asking that a settled establishment should be agreed to and the South of England appor-

Digitized by Google

tioned for the training and exercise of military telegraphists. The Postmaster-General, Lord John Manners, arranged that 5 officers and 160 men should be borne on the Post Office Votes and employed under the Post Office; that the whole of the South of England from the mouth of the Thames to the Land's End, including the Channel Islands, should be their sphere of work; that the engineering work throughout this district should be done exclusively by the Royal Engineers; that 60 of their men out of the 160 should be employed as manipulators and distributed among the principal towns in the same district.

Accordingly, on the 30th April, 1878, Capt. Turner again moved with the headquarters of the 34th Company to Bristol, and took charge of the new South of England Postal Telegraph District. In the following year he succeeded Major Webber in command of the Military Telegraph Establishment under the Post Office retaining Bristol as his headquarters. He was appointed by the Inspector-General of Fortifications an Associate Member of the Royal Engineer Committee for Military Telegraph Questions. He was promoted Major on 31st December, 1878. He remained at Bristol under the Post Office for six more years, and on leaving this command at the end of 1884, after nearly 14 years' service in the Postal Telegraphs he received a letter from the Postmaster-General eulogizing his services, and commending the energy, tact, and discretion he had shown during the time he had been employed under the Post Office.

With his intimate knowledge of military telegraphs Major Turner compiled two textbooks on the subject which were adopted into the Post Office and Military Telegraph Services respectively. Major Turner's *Notes on Military Telegraph Instruments, with Diagrams*, was reviewed by Colonel C. E. Webber in the September number of the *R.E. Journal* of 1884, pp. 212 and 213.

In February, 1885, Major Turner was required to put the peace training of his men to the test of war. He was ordered to Suakin to take part in the second campaign of Lieut.-General Sir Gerald Graham, V.C., K.C.B., on the Red Sea Littoral. Shortly after his arrival at Suakin Major Turner was appointed, on the 7th March, to the Staff as Director of Army Telegraphs. He served through the campaign and took part in the action of Tofrek. He was mentioned by Sir Gerald Graham in despatches. At the conclusion of the Suakin Campaign he was sent to Cairo. He was promoted Lieut.-Colonel on the 6th May, 1885, and from the 27th of that month until the 31st July he was Director of Army Telegraphs with the Nile Expeditionary Force. He received the medal for the Egyptian Campaign, with clasps for Suakin, 1885, and Tofrek, also the Khedive's Star.

The war being over, Lieut.-Colonel Turner remained at Cairo as Executive Officer to Colonel J. M. Maitland, the Commanding Royal Engineer, until the following February when he succeeded Colonel

Digitized by Google

Maitland as Commanding Royal Engineer on the 2nd of that month. For over four years between 1885 and 1890 Colonel Turner, who had been given the local rank of Colonel while holding the appointment of Commanding Royal Engineer, lived on board a dahabieh, alongside the R.E. Mess at Kasr-el-Nil Barracks, at Cairo.

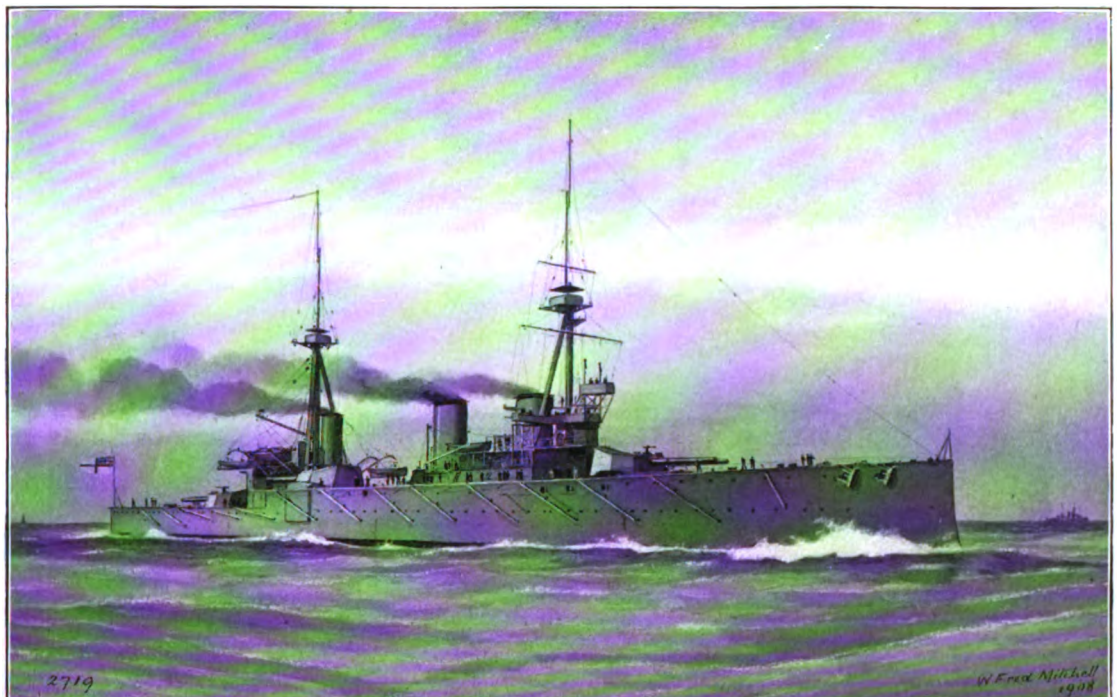
During his tour of service in Egypt Colonel Turner was commissioned by the Egyptian Government, with the consent of the War Office, to make a comprehensive inspection and report on the telegraphs of Egypt. For this he received the thanks of the Government. He took great interest and trouble in getting up a memorial to be placed in the English Church at Cairo, of the Royal Engineers who were killed or who died in Egypt in the years 1882 to 1887. The memorial was designed by him and is generally regarded as the finest of the memorials dedicated to soldiers in the church at Cairo. A photo-zincograph and a description of the memorial appeared in this Journal for August, 1888, p. 167.

On the 6th May, 1889, Turner was promoted Brevet Colonel and when, a twelvemonth later, he came home from Egypt, he was placed on half-pay. He only remained 10 months on the "Shelf." On the 28th February, 1891, he was made a Colonel on the Staff and Commanding Royal Engineer of the North Eastern District. He remained at York until November, 1894. Then he was appointed Deputy Inspector-General of Fortifications at the War Office, and it is interesting to note that the same post was held by his great-grandfather, Lieut.-General William Fyers, at the beginning of the 19th century. On the 24th May, 1896, he was made a Companion of the Bath, and on the 8th November following, having attained 57 years of age, he had to retire from the Service. After his retirement he was employed for a short time in 1900 as a Temporary Inspector under the Local Government Board from 1st January to 7th June. He then went to live at Bath where he had many associations. On the 20th January, 1907, he was awarded the pension for Distinguished Service. He died, after a long illness, at Avonside, Limpley Stoke, near Bath, on the 17th September, 1909. He was buried in Bathwick Cemetery, near many of his relatives of the families of Turner and Fyers.

Colonel Turner had three children—a son and two daughters, viz. :—(1). H. Katherine Theresa Turner, who married Lieut.-Colonel A. C. Painter, R.E. (2). Henry Hamilton Fyers Turner, Major, 2nd Lancers (Gardner's Horse), and D.A.Q.M.G., Headquarter Staff, India. He married Effie Campbell Ross, daughter of Colonel George Campbell Ross, Bengal Staff Corps, and has a son, Reginald Hamilton Fyers Turner, born in 1897. (3). Eleanor Ada Turner, who died unmarried on 12th March, 1889.

Digitized by Google

Digitized by Google



H.M.S. "Indomitable."

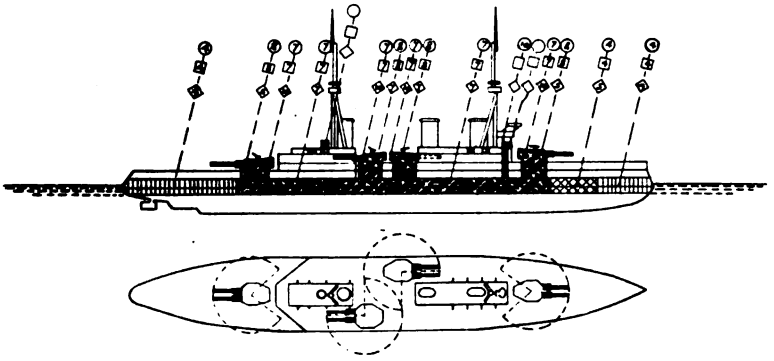
(From a block kindly lent by MESSRS. J. GRIFFIN & CO., *60, Chandos Street, W.C.).*

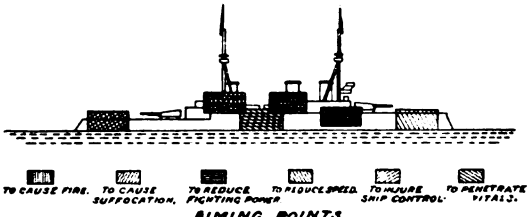
Digitized by Google

TRANSCRIPTS.

A SHIP STUDY OF H.M.S. "INDOMITABLE."

THE following "Ship Study of H.M.S. *Indomitable*" by Lieut. Lull, 1st Lieut., C.A.C., U.S. Army, is likely to prove of interest, and is therefore reprinted by the kind permission of the Editor of the *Journal of the U.S. Artillery.*





ARMOR		EXTREME RANGES FOR SUCCESSFUL ATTACK.				
DISTRIBUTION	MV VALUE IN K.C.	6"	8"	10"	12"	12"M
BELT AMIDSHIP.	7	1150	4400	7650	11150	
BELT FORWARD	4	3200	9200	Limit	Limit	
BELT AFT	4	3200	9200	Limit	Limit	
DECK SIDES	2½ (NS)					
DECK FLATS	2 (NS)					
BELT UPPER	NONE					
BARBETTES	8	NONE	3250	6300	9650	
TURRETS	7	1150	4400	7650	1150	
CONNING TOWER FD	10	NONE	1000	4100	7200	
CONNING TOWER AFT						
PROTECTION TO VITALS	10	NONE	1000	4100	7200	
PROTECTION, H.A. FIRE	4 (NS)					3070 12019

Digitized by Google

1. General Appearance.

Length, between perpendiculars: 530′; over all: 562′.

Beam: 78½′. Maximum draught: 26′. Displacement 17,250 tons.

Freeboard; forward: 32′; amidships: 29′; aft: 20′.

Has high forecastle deck carried back to mainmast.

Funnels, three in number, two elliptical in section between midship turrets and foremast, one circular in section between mainmast and midship turrets.

Masts, two in number, formed as tripods below the tops.

Fire control station in each top.

Identification symbol: 32–2.

Turrets, two on median line, one bow and one stern, and two *en échelon* amidships. Bow and midship turrets on forecastle deck and stern turret on upper deck.

Ram, much less pronounced than in older ships.

Very little excrescence of surface, no sponsons or protruding casemates.

Rapid fire guns mounted on top of turrets.

Forward conning tower surmounted by chart room, flying bridge and signal station, also practically under foremast and within splinter distance of forward funnel.

After conning tower practically under mainmast and within splinter distance of after funnel.

Boats on davits amidships as well as on frame work abaft the mainmast. Probably put overboard before the beginning of an engagement.

Torpedo nets on sides, only to be lowered while ship is at anchor.

2. Armament.

Eight 12″ (Mark XI., 45 cal.).

Sixteen 4″ (Model 1907).

Three torpedo tubes, 18″ (submerged).

12″ guns mounted in pairs in turrets, one turret bow and one stern on median line, and two *en échelon* amidships.

The midship turrets are on the same level as the forecastle and the freeboard is exceptionally high. The guns are, therefore, at a great height above the water line. The after pair of guns, alone, are on the upper deck level, but the deck erection to the rear of these guns is cut away at an acute angle on each side to enable the guns to train as far as possible forward of the beam.

4″ guns are mounted, two on top of each turret, and eight *en château* on shelter decks.

Total fire ahead or astern: Six 12″ and eight 4″.

Total broadside fire: Eight 12″ and twelve 4″.

12″ guns fire 850 pound projectile, using modified cordite, with a muzzle velocity of 2,900 f.s.

Rate of fire of 12″: One round per minute.

4″ guns fire a 25-pound projectile, muzzle velocity unknown.

Digitized by Google

3. Ammunition.

Ammunition supply, unknown.

Special attention has been paid to the facility with which ammunition can be supplied under unfavourable circumstances.

4. Fuel.

Capacity at load water line, 1,000 tons of coal or equivalent weight of fuel oil.

Maximum capacity, 3,000 tons of coal and 700 tons of fuel oil.

Trial trip showed the following coal consumption :—

For 8,480, I.H.P., 2·6 lbs. per H.P. per hour; speed, (calculated) 10·2 knots; consumption, 20,352 lbs. per hour.

For 29,300, I.H.P., 1·6 lbs. per H.P. per hour; speed, (calculated) 23·0 knots; consumption, 46,880 lbs. per hour.

For 43,700, I.H.P., 1·2 lbs. per H.P. per hour; speed, 26·3 knots; consumption, 52,440 lbs. per hour.

Two inner shafts are provided with cruising turbines not included in the above tests, rate of consumption unknown.

5. Speed.

Designed speed, 25 knots.

Maximum speed on trial trip, 26·3 knots.

Vessel crossed the Atlantic Ocean at an average speed of 25·1 knots, breaking the Trans-Atlantic speed record.

Vessel equipped with special turbines on inner shafts for the purpose of cruising. Economical speed unknown.

6. Cruising Radius, Etc.

Radius of action under high-speed turbines, 4,400 miles, (calculated).

Radius of action under cruising turbines, unknown.

Vessel said to be remarkably handy.

7. Best Method of Attack.

Attack to be opened with each type of gun or mortar at extreme limit of range, as follows :—

Mortars	12,000 yards.
12″ B.L.R.	13,000 ,,
10″ B.L.R.	12,000 ,,
8″ B.L.R.	11,000 ,,
6″ B.L.R.	10,000 ,,

Guns below 6″ calibre not to engage.

Mortars will use D.P. shell at all ranges. Deck penetration may occur at all ranges in Zones III. to VIII. inclusive.

12″ rifles will use A.P. shell at all ranges. Perforation of vitals may occur at ranges under 7,000 yards.

Digitized by Google

10″ rifles will use A.P. shell at all ranges. Perforation of vitals may occur at ranges under 4,000 yards.

8″ rifles will use A.P. shell beyond 1,000 yards and A.P. shot, under 1,000 yards for perforation of turrets and vitals.

6″ rifles will use A.P. shell at all ranges.

All fire to be as rapid as consistent with good gunnery.

Aiming points :—

1. Foot of foremast: Endangers conning tower, chart house, fire control station, forward funnel and forward turret. The best target.

2. Foot of mainmast: Endangers after conning tower, after fire control station, after funnel, after midship turret and boats (if not cast over).

3. Rear edge of forward deck structure: Endangers middle funnel, forward midship turret and boats (if not cast over).

4. Stern water line: Endangers screws and steering gear and may waterlog stern making ship unmanageable.

5. Bow water line: May waterlog bow, reducing speed and making ship hard to manage.

6. Water line amidships: Endangers midship turrets and, at short ranges gives promise of penetration of vitals.

'R.W.'

Digitized by Google

FORTRESS MANŒUVRES.

Translated from the *Militär Wochenblatt* of 14th and 16th October, 1909, by Major B. Atkinson, R.F.A., G.S.

THE new "Foot Artillery Regulations" marks a notable advance in that, commencing from the action of the arm in battles of encounter, it proceeds to a systematic study of the attack upon an enemy deployed in position, upon fortified positions in the field, and upon barrier forts. Finally it discusses the attack and defence of fortresses.

The training manuals of the other arms will have to be brought into line with this new development, if the fact that siege operations are no longer the domain of the purely technical troops is to be brought out. Infantry is the most important arm in siege as in field operations. "It alone breaks up the final resistance of the enemy. It bears the main burden of the battle. In compensation, it usually obtains the greater glory."—(*Infantry Regulations*, para. 264).

Generals, who will in most cases have been infantrymen, will have to attack and defend fortresses in real war; they will have artillery and engineer officers to advise them.

In order to prepare for war, officers must not only participate in exercises in siege operations, but they must also learn to direct them. Such exercises may be in the form of war games, or staff rides, or manœuvres with real troops; they may represent either an entire siege, or a single phase carried out by one, or by all arms. These exercises are indispensable to preparation for war, and will provide much valuable instruction. We wish to lay stress on the advisability of securing senior infantry officers, not only to take part in, but to direct such operations.

A glance across the eastern and western frontiers of Germany will show that fortresses must play an important part in our future wars; and that, if we are to invade hostile territory, we shall certainly be compelled to undertake siege operations. In fortress warfare, unlike field operations, many important duties can be adequately dealt with by discussions, war games, or staff rides, in which troops can be dispensed with, or in which at the most only a single arm—communication troops or foot artillery—will be necessary. These exercises may include all measures prior to the deployment of the besieger's artillery, and to the occupation of their positions by the guns of the defender; as also the arrangements made for fortifying the positions of the artillery, which will seldom be actually carried out on account of expense. Portions of these tasks may however be usefully carried out by single arms as a separate exercise. For instance, the actual deployment of an artillery brigade by night would be specially instructive; the proper quantities of stores would be drawn, and the necessary entrenchments would be executed.

Digitized by Google

Fortress manœuvres are practically a combination of war games, staff rides, and actual operations; the (strategic) war game comprising the isolation of the fortress from the larger operations; the staff rides dealing with the investment up to the beginning of the artillery deployment. Troops will not be necessary before this point is reached; the fighting in the remoter zone of investment differs very little from actual field operations, and will indeed often provide excellent manœuvre schemes which will be free from the necessity of assuming an existing fortress to be an open town.

The employment of the main reserve, and the conduct of the defence of advanced positions, provide valuable exercises which can easily be represented, together with the risks inseparable from them. As examples may be cited the employment of the main reserve in a decisive battle fought at a great distance from the fortress, or the obstinate defence of advanced positions lying beyond the range of the artillery of the fortress.

The field of action of the troops in advanced positions lies within effective range of the fortress artillery; as long as the fire of the fortress guns is effective on the inner flank of the advanced detachments, this flank will be protected and the detachments cannot be driven away from the fortress.

It will be found an interesting exercise to take the fighting during the investment of a fortress, (*e.g.* the V. Corps before Paris on the 19th and 20th September, 1870) as the basis of a manœuvre scheme, and then to pass from field manœuvres to fortress manœuvres. The execution of all duties and tasks under service conditions will be found more important than it is in field manœuvres; for slovenly work, inadequate cover, or a carelessly calculated mine charge may endanger the success of an operation. It is certainly true that, in field operations, a daring attack may, despite all principles of tactics, be driven right home; but any amount of self-sacrifice and valour will be useless in fortress warfare, if adequate passages have not been prepared through the obstacles, if means for crossing the ditch are lacking and if the fire from the works defending the ditch has not been subdued. "In both field and fortress warfare the tactical problem is the destruction of the personal element embodied in the man and his weapon. Not until the man has been crippled does the technical problem advance into prominence; this problem consists in removing the material means of resistance, prepared during long periods of peace, which may impede the tactical assault, and thus render it impossible to use cold steel against the defender who, by now, will have been shot into a state of demoralization. This combination of tactical and technical skill is the essence of fortress warfare and distinguishes it from purely field operations."

Though often little considered in field operations, the measure of rest accorded to the officers and the troops is an important factor in fortress warfare; for the exercise cannot be interrupted as long as war conditions are assumed to exist. Also the night, which during field manœuvres is usually devoted to rest, is essentially the period for fighting and working in fortress warfare. It is of course impossible to practise every characteristic of siege operations, want of space will render it necessary to be

Digitized by Google

content with a section of the circumference of the fortress as the area of a more or less vehement struggle; and the fact that the time of the troops is often limited also restricts the field of action. But, whether the deciding factor be space or time, operations against the forces which are not being actually attacked should be carried on simultaneously on paper. For instance, the directing staff may choose the phase between the artillery deployment and the establishment of the first infantry position, or they may choose the struggle at close quarters for some fort and the ground on either side of it. The possibilities offered by this latter exercise have been considerably enriched by the work of Capt. Kranz on the Siege of Port Arthur (Beiheft No. 7 to the *Militär-Wochenblatt* of 1909).

The exercise must be so arranged as to entail for the defender offensive action by spade work, by fire, and by sorties. The more active the defence the stronger will become the desire of the soldier not to abandon his position of his own free will; and as, on the other hand, the attacker must be given a chance of carrying through his attack, the decisions of the umpires will be particularly difficult. In the event of an obstinate struggle for a position, if the defence has been skilful and energetic, it may become necessary, for the purposes of the scheme to adopt the expedient of assuming the attack to have succeeded in effecting passages through the obstacles; and then, just before the assault takes place to let the defenders retire unmolested to the position where they propose to renew their opposition. This is always better than letting the troops await the umpires' decision at close quarters, with their arms at the order, and often in inextricable confusion.

Whatever phase of a siege is to be represented the directing staff must always have a clear idea of what proportion of loss the defender must be assumed to have incurred; for this loss must finally be so great as to give the attackers the advantage, notwithstanding all the measures taken in time of peace. The casualties in the front of attack will be replaced by bringing in troops from the neighbouring sections, and finally by throwing in the main reserve. These measures will provide considerable reinforcements for the troops in the main battle position. The section and main reserves are a reservoir for maintaining the firing line, the garrison of forts, and the local reserves at a constant strength; casualties are thus felt gradually by the reserves, their strength being decreased in each section of the defence in succession, until they are all absorbed in the fighting positions. The same principle will hold good in the case of artillery. The commander of the defence must be told each morning how many flat and high-trajectory guns, and how many batteries he has in a serviceable condition. As a guide, the directing staff should have some indication of the effect of the attacker's artillery; this will be best secured by obtaining graphics from group commanders, showing how many shell should, according to the orders received by them, have fallen into each separate section. For simplicity's sake, the directing staff will as a rule have to allow for alterations in the distribution of fire originally sent in to them (*e.g.* some of the artillery may find itself compelled to move to avoid hostile fire which is becoming too hot for it).

Digitized by Google

Another interesting question will now arise. It is the extent of front which the directing staff should allot to the attack and the defence. Assuming these reliefs, and taking the densest portion of the firing line at one rifle per metre of front, a width of 1,000 metres (1,100 yards) will be suitable for an infantry regiment (3 battalions) during the first phase of the attack; so that an infantry division (12 battalions) with its four regiments abreast can occupy a front of 4,000 metres (4,400 yards) This frontage would, however, appear too great for the execution of the close attack; and it will be better, in the case of an attack upon a fort, to regulate the divisional interval by retaining a regiment in second line as reserve, and finally for the assault. Then, allowing 800 metres (880 yards) per regiment, the width of a divisional section will be 2,400 metres (2,600 yards).

The defender is in a much less favourable position. Allowing one rifle per metre of the fortress circumference, and taking, as an example, a circumference of 30 kilometres (19 miles) the garrison must be 30,000 strong. Of this number some 6,000 must be told off as the main reserve; 2,000 more will form the garrison of the keep, so that some 22,000 will remain for the defence of the perimeter. Assuming now the actual front of attack to be 9 kilometres ($5\frac{1}{4}$ miles) wide, and allowing one rifle per metre, it will take 9,000 men, and another 3,000 to garrison the works; there will then remain 21 kilometres (13 miles) of perimeter to be garrisoned by only 10,000 men. It will also be necessary to consider to what extent troops may have to be taken from the sections which are not being directly attacked. The decisive battle on the front of attack (9,000 metres, (9,900 yards)), will thus take place with about four infantry divisions (48,000 men) against 9,000 men in the fighting line and 6,000 men in the general reserve (excluding the garrisons of the works).

In fortress manœuvres which are planned to terminate with the establishment of the infantry in their first position, a real fortress is by no means essential to the scheme. The works may be marked out in a simple manner by flags; or suitably sited farms and copses may be assumed to be forts and provisional defences.

The manœuvre scheme will become much more difficult when it is proposed to represent the close attack. In this case it is necessary, if only for practice in intelligence work, to have real works adapted to service conditions by labour in time of peace. The construction of a mine system is also desirable. The course of the exercise will naturally be influenced in great measure by the fighting assumed to have preceded it, and by the effect of the guns, which, in places, will have dug out craters and made gaps in the obstacles, thus lightening the task of the attack. Labour under peace conditions will, however, be unable to produce a true picture of the condition of the works as they would really appear.

However, let it be assumed that the attack has progressed to within 150 or 200 metres (160 to 220 yards) of the fort, and has dug itself into its fighting position (*e.g.* the fourth infantry position). In former days the assault might have been delivered from this distance; but the

Digitized by Google

experiences of Port Arthur demonstrate that it is necessary to approach considerably nearer, so that from the position from which the assault is to be delivered there will be only a single obstacle, such as the ditch, to be surmounted. The fight for the counterscarp—in other words, the assault—will now have to be represented; but in order to describe what the condition of the works would really be in war, still greater calls will have to be made on the imagination of all the combatants. The following paragraphs are an attempt at describing this condition from the point of view of the directing staff:—

Intelligence concerning the Condition of the Works and the Zone of Attack after the Bombardment.

A.—*The Works.*

1. The portions of the parapet of the main rampart which are visible from without have been knocked out of shape by the enemy's fire; the works give the impression of irregular heaps of earth. The guns on the rampart are unserviceable. The splinter-proof look-out towers and the armoured observation posts on the main wall can no longer be used.

2. The exposed revetment walls at the foot of the exterior slopes of the parapets have fallen in; in many places their débris provides passages over the wire entanglement at the bottom of the ditch and on the exterior slopes of the parapets.

3. The caponiers at the salients have been shot away in places. The embrasures on both sides are no longer serviceable for guns. Single infantrymen still find cover amongst the débris.

4. The caponiers at the angles have not suffered so much.

5. The caponiers in the outer wall of the ditch, and the intermediate defence are still fairly intact; but the fencing on the outer wall of the ditch, etc., is mostly shot away.

6. The heavy high-explosive shell have made numerous craters amongst the obstacles in the advanced ditch and on the glacis. Their detonations have destroyed the greater portion of the mines.

7. The blockhouses on the covered way have been destroyed, and are abandoned by the defence.

8. Only during comparatively long pauses in the firing are a few solitary sentries or patrols of the defenders visible. While the bombardment continues the works show as little life as if they were deserted by the garrison.

9. Some of the parapets of what were formerly connecting batteries are still held by infantry, who are very active in patrolling towards the flanks, and who remain in observation from these works and from adjacent rifle pits.

10. The defensive works in the defenders' main position to the south of X, Y, and Z, are masked from view. The attack cannot ascertain if guns are in position at these points.

11. The attack possesses no information concerning the condition of the interior or of the rear face of the fort.

Digitized by Google

B.—*The Zone of Attack.*

1. The attack has not succeeded in destroying the walled shelters for the infantry reliefs; nor have the artillery and ammunition stores suffered severely.

2. The trench-like rifle pits sited round the infantry redoubts have been mostly destroyed.

3. The rifle pits between the infantry redoubts and the works are difficult to locate and have suffered less.

4. Though the wire entanglements have suffered damage in many places, the artillery of the attack has not yet succeeded in creating a sufficient number of practicable passages right through them.

The defender continues to show signs of vigorous activity behind the obstacles. During attempts at demolition he lights them up by means of flares and torches, and, in spite of heavy losses, works unceasingly at their repair.

5. Up to this period sorties have issued through gaps in the wire entanglements between W on the east and A on the west.

6. The attack has been unable to determine what precautions, if any, the defence has taken to block these gaps against an assault.

7. Balloon observation has established the existence of fortifications on the southern edge of the outer town, and three earthworks to the west of X with rifle pits, etc., in the gaps and towards the rear.

8. No movements of troops have been noticed between or behind the the works. This points to the probability that numerous shelters for the reliefs are being gradually constructed in which even the reserves have found at least splinter-proof cover, excepting those in spaces A and M which are no longer being used by the artillery.

9. The searchlights are no longer working.

o o o o o

The first thing to determine is the manœuvre area. Assuming the interval between forts to be 3,000 metres (3,300 yards,) a fort in a position favourable for attack should be chosen as an objective, and a space 300 to 400 metres wide (330 to 440 yards) on either side allotted to the defence. The fort garrison may consist of a single company; the spaces of 300 or 400 metres on either side will each be half of the section of the main position which would be allotted to a battalion. As a matter of fact a company which could be reinforced by the local reserve to beat off an attack, is capable of defending 500 to 600 metres (550 to 660 yards) of front; but the width of 300 to 400 metres (330 to 440 yards) is chosen with regard to the probable peace strength. In order to enable as many infantry officers as possible to take part in the exercise, the section nearest to the fort may be garrisoned by a company, and the duties of the neighbouring companies merely worked out on paper. It will be well to detail a pioneer company at war strength, and to mark the positions of the guns still serviceable. The fire of these latter can be represented by puffs. It will be an advantage if field artillery can participate in the exercise. There will thus be:—

Fort Garrison.—1 company (at war strength).

Digitized by Google

Fighting Position.—No. I. Battalion consisting of one real and one imaginary company; No. II. Battalion of similar strength, and a section of pioneers. That is, one real and one imaginary company of both No. I. and No. II. Battalions in each battalion section.

Local Reserves.—Of similar strength to the lines in front; that is, one real and one imaginary company of both No. I. and No. II. Battalions in each battalion section.

Reserve.—No. III. Battalion, one section of pioneers, and one section of machine guns (two real and two imaginary companies). This makes eight companies of infantry employed including the fort garrison of the fort *

Commanders for the above should be appointed as follows:—

Commander of the Side.—A colonel or lieutenant-colonel with artillery and engineer advisers.

Right Half Section.—The O.C. No. I. Battalion.

Left Half Section.—The O.C. No. II. Battalion (captain).

Reserve.—The O.C. No. III. Battalion (captain or field officer).

It will, as a rule, be sufficient for the commander of the side to work out the detail concerning the sections as a whole.

In the same manner No. 2 Infantry Regiment and 3 companies of Fortress Pioneers should be detailed to the attack. They will attack the fort supported by No. 1 Infantry Regiment on the right, by No. 3 Infantry Regiment on the left. In reality, the attack will be carried out with No. 2 Regiment alone, the supporting regiments to right and left being represented by only a single company, and the remainder being either imaginary or denoted by flags. The action of these imaginary troops will, however, be dealt with in orders written by officers of the rank of captain.

Thus, the attack will consist of 3 battalions, a machine-gun company, and 3 companies of pioneers. The troops in the adjacent sections will be represented by 2 field officers or captains commanding sections, and 6 companies, which will include supports and reserves.

The exercise will therefore require a strength of about an infantry brigade, the brigade commander acting as director.

Umpiring should be the special duty of the infantry, the principal fighting arm. Umpires should work in three reliefs, each of about six hours. Senior officers of engineers and artillery are especially suitable for the directing staff, juniors being employed as intelligence officers to the section commanders. Arrangements must be made to indicate to the defence, by means of a mast with balls and lanterns, when hostile artillery is firing on the works or positions, when pauses occur, and when the artillery fire is switched to other objectives. The attacker must similarly be informed when portions of his force are at work under the fire of the defence (mast with semaphore).

The pioneers should be given opportunities of executing technical duties in co-operation with the infantry, and of using the different natures

* The number of real companies appears to be seven, not eight, unless the company at war strength is counted as two.

Digitized by Google

of illuminating material; in this the counter-measures of the defence will probably create difficulties.

The artillery will be able to acquire information as to the methods of employing the observers sent forward with the infantry, and as to their own participation in the close attack. They will have to be quite certain as to the ranges up to which they can continue firing over their own infantry.

The commander will find himself confronted with numerous problems. He will have to decide if he is to attack the fort and the outworks simultaneously, or if he is to isolate the former before he attacks it. There is something to be said for either method.

But the finest and most glorious field for action is reserved for the infantry arm. Infantry officers seeking guidance in this matter need only consult Beiheft No. 7 of the *Militär-Wochenblatt* of 1909. The following items will be found of especial importance:—

1. The attack must be compelled by means of flank fire from guns, field guns, and machine guns to advance methodically and to use sap and shelter trench.

2. As he approaches by means of these devices he must be disturbed by sorties of small detachments armed with hand grenades; such sorties should likewise be made whenever the means for reconnaissance and observation prove ineffective.

3. Searchlights and machine guns are dangerous enemies. They must, without exception be destroyed as soon as possible by sorties or by fire—even field gun fire.

4. When the attacker decides to move his infantry up to within very close range of the defence, his artillery fire will have to cease. At this period the defender must not allow himself to be beaten down by infantry fire alone. The attack must employ every device to draw the defender close up to his parapet, and then attack him with a superior volume of fire. The decision of the close encounter will be by fire, and not by methodical spade work. Just as in field operations artillery fire is drawn by an infantry demonstration, so in fortress warfare the attack must secure infantry targets by the selfsame method.

o o o o o

Fortress manœuvres rejoice in no great popularity in the army, partly because the men are still somewhat unaccustomed to the evolutions of siege operations. But the fond belief that the army can to-day adapt itself to the exigencies of fortress warfare, as it did in the 1870—1871 campaign, cannot hold ground for a moment. It may, it is true, be able to do so after a certain period; but what troops have neglected to learn in time of peace they will learn in the presence of the enemy only by much sacrifice of time and blood.

Digitized by Google

GENERAL REPORT ON THE ENGINEER TROOPS OF THE ITALIAN ARMY.

(*Continued*).

By Capt. Don Rafael Marín del Campo.

(Translated from the *Memorial de Ingenieros*, January, 1910).

III. Military Schools.

Entry of Officers.—Engineer officers, like those of the whole Italian Army, come, speaking generally, from two different sources, namely directly from the cadet schools or from the ranks.

The non-commissioned officer who aspires to become an engineer officer must pass certain tests and examinations, and afterwards go through three courses, two in the Military School at Modena and one at the Artillery and Engineer School.

The student, who has finished his secondary studies at some Lycée, Technical Institute, or Military College, and wishes to become an engineer or artillery officer, must after admission by examination pass three years in the Military Academy and two years in the Artillery and Engineer School. Both these establishments, which have been visited by the writer, are in Turin, and will be described in this article.

Military Academy.—This centre of military instruction is common to the two sister services (Artillery and Engineers); that is to say that, during the three years that the students remain there, they all wear the same uniform and no distinction is made between them.

They all form one brigade under a major, and are organized in three companies, to each of which are attached one captain, three lieutenants and the students of one term. In all they amount to a little over two hundred.

The officers named in the preceding paragraph, who receive an annual allowance of 300 lire (£12), are entrusted with the care of the students and with their instruction in purely military and practical subjects.

There is a separate staff of science professors, partly military and partly civilian—the latter predominating.

The military professors are graded as professors (majors, captains or lieutenants), or assistants (lieutenants), and receive annual allowances at the rate of 500 (£15) and 300 (£12) lire.

Digitized by Google

The civilian professors are either permanent, *i.e.* drawing the pay of the appointment, or attached, *i.e.* only receiving an allowance as being already professors of some other Government establishment.

Masters and instructors (officers, N.C.O.'s or civilians) for gymnastics, riding, and fencing, complete the instructional establishment.

The head of the Academy is a colonel, and is called the Second in Command, as there is a general above him who also controls the Artillery and Engineer School. Almost the whole of the weight of the direction of the Academy falls upon the colonel.

There are two heads of studies: one civilian professor for scientific subjects, and the Commander of the Brigade of Students for military instruction, regulations and physical exercises.

The following table will show the subjects of instruction and the time allotted to them: —

TABLE I.

General Organization of the Scientific Instruction in the Military Academy, Turin.

Subjects.	Number of Lessons or Classes (1).			Marks (2).	Programmes.
	1st Term.	2nd Term.	3rd Term.		
Military Art	25 (3)	60	30	10	I.
Mathematical Analysis, Part I.	75 (3)	—	—	10	II.
,, ,, ,, II.	—	90 (3)	—	10	III.
Analytical Geometry	—	90 (3)	—	10	IV.
Mechanics	—	—	90 (3)	10	V.
Descriptive Geometry, Part I.	50 (3)	—	—	10	VI.
,, ,, ,, II.	—	—	60	10 (4)	VII.
Military History	—	60 (3)	60 (3)	9	VIII.
Small Arms and Musketry	—	60	—	9	IX.
Field Fortification { Lectures	—	30 (3)	—	9 (4)	X.
Field Fortification { Drawing	—	30	—		
Artillery	—	—	60 (3)	9	XI.
Topography { Lectures	50 (3)	—	—	9 (4)	XII.
Topography { Drawing	25	—	—		
Military Literature	25	30	—	8	XIII.
Physics	75 (3)	—	—	8	XIV.
General Chemistry	—	60 (3)	—	8	XV.
Applied ,,	—	—	60 (3)	8	XVI.
Descriptive Geography	75 (3)	—	—	8	XVII.
Law	—	—	30 (3)	8	XVIII.
French	50	60	—	7	XIX.
Administration and Accounts	—	—	15	7	XX.
Linear Drawing	50	—	—	7	XXI.
Freehand ,,	25	—	—	7	XXII.
Landscape and Panorama Drawing	—	—	30	7	XXIII.
Architectural Drawing	—	—	45	7	XXIV.
German (voluntary)	—	60	60	0·10	XXV.
Total number of classes	525	630	540		

(1). Ordinary classes, those intended only for questioning and drawing classes last 1 hour and 10 minutes.
(2). Marks are allotted half for merit during the year and half for examinations.
(3). In this subject a weekly class is held solely for asking questions, apart from those which can be asked in ordinary classes.

Digitized by Google

In order to thoroughly explain the preceding table it should be stated that the entrance examinations are similar to those held in Spain in similar institutions.

TABLE II.

General Organization of the Instruction in Physical Exercises and Purely Military Subjects.

Subject.	Number of Weekly Classes.	Duration of each Class.	Marks.
Gymnastics and Cycling	4 (2)	30 to 35 min.	
Fencing	4	30 to 35 min.	
Riding	2 (2)	40 min.	
Military Subjects (Tactics, Regulations, Nomenclature, Employment and Manœuvres with Artillery and Engineer Equipment)	3	1 hr. 10 min.	7
Tactical Instruction (on Sundays)...	1	2 hrs. 20 min.	
Moral and Military Qualities (1)	—	—	10

(1). The marks for moral and military qualities are given before the commencement of the examinations by the military officers of the Academy who assemble for the purpose. All the military qualities of the students are considered, including such conduct as may show the possession of a good military spirit.
(2). In the 2nd and 3rd Terms a little less gymnastics and a little more riding are done.

From the very detailed time tables which were given to the writer he has drawn up the following table which shows the daily hours of work:—

TABLE III.

General Distribution of Time at the Military Academy, Turin.

Subject.	Average Number of Hours daily.
Purely Intellectual Work (Study and Scientific Classes, including Drawing)	8 hrs. 42 min.
Military Instruction (Theoretical and Practical)	39 min.
Physical Exercises (Gymnastics, Cycling, Riding and Fencing)	1 hr. 4 min.
Meals and Free Time	5 hrs. 35 min.
Sleep	8 hrs.
Total	24 hrs.

In what I have called "free time" is included all the intervals between the different subjects (usually 10 minutes) which are classed as times of recreation, the time lost in dressing, undressing, etc., and the hour and a-quarter of liberty which the students enjoy outside the Academy after the mid-day dinner.

On Sundays there are not classes for scientific subjects, but work goes on almost to the same extent as during the week. It will suffice to say that all the freedom allowed to the students consists of a short hour for recreation after the principal meal, another half-hour from 1 to 1.30 p.m.

Digitized by Google

and three hours outside the Academy from 6 p.m. to 9 p.m. Practically all the rest of the day is spent in study, moral instruction, the working out of scientific exercises, the cleaning of the person and the clothing, inspections and technical instruction.

I must pause here to make a few short remarks:—

I recognize that this organization of the academic life is much superior to that which exists in certain other countries where the student is looked upon merely as a thinking machine, and is denied during the greater part of his career practice in gymnastics, riding, fencing, games, and in a word all physical exercises. He might as well be denied bread, air and water, but the ideal is that he should absorb knowledge as rapidly and at as high a pressure as possible.

It is not my intention to make comparisons between Italy and those countries and armies which are so behindhand in educational matters. I intend only to inform the reader who may not have studied these very important questions, that the general order of life in the Military Academy of Turin does not completely accord with the principles and practice which now obtain amongst those nations which march in the vanguard of progress. This I do in the hope that if any of my readers should be able some day to influence more or less directly the reorganization of our establishments for military education they will perceive that it is not in the Latin countries that we must seek for models in this matter.

The last important reform in military education, as far as I am aware, which has been carried out, is that recently introduced in the training of naval cadets in England. It has been of such a transcendental character, that it has produced, even in that very advanced country, a profound and general sensation, and its results have been so excellent that many professors and university authorities have studied it.

At the Royal Naval College, Osborne, to which the English naval cadets are first sent, Sunday is quite free, and the afternoons of Wednesdays and Saturdays are also free, and the students devote them to games, excursions, and in a word to physical exercises.

The following table shows the distribution of time:—

TABLE IV.

General Distribution of Time at the Royal Naval College, Osborne.

	Number of Hours a Week, Exclusive of Sundays.	Daily Average.
Purely Intellectual Work	24 hrs. 45 min.	4 hrs. 7 min.
Workshops	16 hrs. 30 min.	2 hrs. 45 min.
Physical Exercises (Gymnastics, Games, etc.).. ...	26 hrs. 15 min.	4 hrs. 23 min.
Meals and Free Time	21 hrs.	3 hrs. 30 min.
Sleep	55 hrs. 30 min.	9 hrs. 15 min.
Total	144 hrs.	24 hrs.

Digitized by Google

But let us return to the Military Academy, Turin. The course begins on the 1st October and ends in the middle of August, the last month or month and a-half being devoted to a tour and to field exercises, which have for their main object the application on the ground of the principles which have been learnt during the previous months, and to accustom the students to life in the field where they can be practically trained in tactics, outposts, camping, fieldworks, etc., and the methods of giving first aid to the wounded in war.

During the course they fire with the revolver, rifle and field gun, and are instructed in range finding.

The equipment of the student is, of course, identical with that of the soldier. Each, therefore, carries his knapsack and shelter tent at all tactical exercises or marches, however unimportant they may be, in the same manner as I have described in the second part of my article.

The royal cipher with a number on the left arm indicates good conduct during the last term. Those cadets who are most distinguished by their conduct and military knowledge are made corporals and there are also instructors, belonging to the third class, who help the officers in the instruction of the newly joined cadets.

The public rooms, such as the dining hall, dormitories, baths, hospital, halls of study, etc., are good and well arranged.

There are physical and chemical laboratories, and a museum containing models of guns, projectiles, rifles, vehicles, mountings, engineering material, etc., and a topographical and geographical museum with large models in relief of the Alps and frontier districts and a rich collection of maps of Italy issued by the Institute of Military Geography.

The Academy also possesses several guns for drill purposes.

There is a large covered gymnasium, with few but practical apparatus, and another open gymnasium containing jumps and other obstacles; also a very good fencing room where every student keeps his mask, gauntlets, etc. In addition there is a covered manège, and it should be noted that the students of the third class carry out a mounted tour. There are about 100 horses belonging to the riding establishment of the Academy.

About 50 bicycles are provided for instructional purposes, and are used during the practical course.

The central square is very large, but is enclosed, the students play football, etc., there.

The prison or correctional establishment surprised me by its stern appearance which is undoubtedly excessive. I will omit all details, but will merely state that the repressive system employed there is being softened, as is shown by the fact that both there and in barracks the punishment diet of bread and water has been discontinued.

There is a mess in the Academy for the professors, with a dining room for those who are unmarried.

I was present at the instruction given in gymnastics, fencing, riding and gun drill, and, on one Sunday, at the tactical exercises carried out on

Digitized by Google

the garrison drill ground. The classes are divided into six small groups, so that individual instruction may be given.

One detail which pleased me very much was that the students took with them to the halls of study, not merely their books, but also their bats, racquets, etc., so that they could make full use of the 10 minutes allowed for recreation between each class.

I was much pleased with the instruction which I witnessed. This, with the fact that in all international competitions in riding, skiing and other military exercises Italian officers have for some years reached a very high standard, and also the growing favour which physical exercises enjoy both in the army and in the nation, leads me to hope that when it is decided to implant in the primary education of the officers reforms analogous to those which have been introduced in the English naval schools, they will become the admiration of the whole world.

The appearance of the students of the Military Academy is satisfactory in spite of the excessive intellectual work to which they are subjected. This I attribute firstly to their entering at the age of 18 at the termination of the secondary education—that is to say when they have developed sufficiently to undertake serious studies; and secondly to the good food they receive, the very busy lives which they lead, to their living as boarders, and to the importance which is given to physical exercises.

School of Application of Artillery and Engineers.—This establishment differs considerably from the one which I have just described.

On passing out of the Military Academy the students are posted to the Artillery or Engineers, and are promoted sub-lieutenants. They have then to go through a 2-years course in the School which will not be described.

There is here a complete separation of the instruction given to the officers of the two arms. Each course is divided into three sections, two for the Artillery and one for the Engineers.

With very rare exceptions all the professors are officers.

The Second in Command of the School is a colonel. Two lieut.-colonels, one belonging to each arm, are the heads of the practical instruction (see Table VI.). There is one captain with one lieutenant in charge of each section, with duties similar to those of the officers of a company at the Academy. The professors of the scientific subjects are either effective (lieut.-colonels, majors or captains) or assistant (lieutenants). There are also instructors (officers, N.C.O.'s or civilians) in riding and fencing. The rates of pay of the instructional staff are the same as those given at the Academy.

The programme of work of sub-lieutenants of Engineers will be seen from the following table:—

Digitized by Google

Table V.

General Organization of the Scientific Instruction at the School of Application of Artillery and Engineers, Turin (Engineers).

Subjects.	Number of Lessons or Classes.		Marks.
	1st Course.	2nd Course.	
Applied Mechanics, 1st Part. Strength of Materials: Lectures	50	—	10
Applied Mechanics, 1st Part. Strength of Materials: Drawing	35	—	
Applied Mechanics, 1st Part. Hydraulics, Thermodynamics, Kinematics: Lectures	60	—	
Applied Mechanics, 2nd Part	—	90	10
Explosives	30	—	10
Permanent Fortification, 1st Part: Lectures	70	—	10
Permanent Fortification, 1st Part: Drawing	30	—	
Permanent Fortification, 2nd Part: Lectures	—	60	10
Permanent Fortification, 2nd Part: Drawing	—	50	
Architectural Construction: Lectures	90	—	10
Architectural Construction: Drawing	40	—	
Road and Hydraulic Works	—	15	10
Construction: Lectures	—	70	10
Construction: Drawing	—	55	
Applied Electricity	—	45	9
Science	—	20	9
Practical Geometry	60	—	9
Architecture, 1st Part: Lectures	20	—	9
Architecture, 1st Part: Drawing	60	—	
Architecture, 2nd Part: Lectures	—	15	9
Architecture, 2nd Part: Drawing	—	65	
Artillery	35	—	9
Naval Art	—	12 (1)	—
Exercises and Visits outside the School relating to Field Fortification, Practical Geometry, Architecture, etc. (2)	—	—	—
Total number of classes	580	497	

(1). Explained by a naval officer specially detailed for the purpose. The students are not examined in this subject.
(2). Complementary to the instruction in the various subjects.

The system of instruction which is followed can be seen from an inspection of the above table. I will add, however, a few words, as I had three interviews at the School with the Professor of Construction and the assistant professors of Architecture and Fortification, who were so good as to give me much information as to the work carried out by the students.

During the construction course each student has a note book in which he works out problems—as a rule one in each subject—which are marked by the professor. This note book is retained by the student and serves as a manual compiled by himself and corrected by his professor. Once a week one analytical and numerical problem is solved to show the application of theory, and graphical solutions are worked out during the hours devoted to drawing.

The 60 drawing lessons during the first part of the architectural course are devoted, (1) to copying a series of designs, (2) to preparing a design. During the 65 lessons in the second year a complete project is drawn up, differing for each student (barracks, hospital, store, etc.).

Digitized by Google

A similar system is followed during the fortification course. During the first part the students, (1) copy drawings of fortifications, and (2) design a modern battery, different data being given to each student who has to site the battery and draw the plan and elevation which he considers suitable for the ground allotted to him so as to accord with the tactical object of the work. During the second year a complete project is worked out in the same way as in the architectural course.

This practical work of the student, guided by the professor and his assistant, is worthy of unreserved praise, as there is no better means of teaching design.

Besides this, the fact that the School is situated at Turin, a large town as well as a great military centre, allows of numerous visits being made to various works which are in course of construction.

The method of conducting the examinations is prescribed and varies according to the subject, but in all cases the drawings and projects which have been made during the course are submitted to the examiners. The following examples show the method that is used :—

Construction: Written exercise relative to the stability of bridges, walls, etc. Time allowed 8 hours. The use of books and manuals permitted. *Vivâ-voce* examination, lasting 20 minutes, on the subject of the exercise and on other matters.

First Part, Architectural Course: *Vivâ-voce* examination lasting 20 minutes.

Second Part, Architectural Course: *Vivâ-voce* examination, lasting 20 minutes on the project done during the year, and on other subjects.

In addition to the professor and his assistant, other professors and assistants who desire to do so attend the scientific classes. The size of the audience is relatively great when a lecture is being given by a professor who enjoys a good reputation.

The following table gives an idea of the remaining subjects which are taught at the School, under the supervision of a lieut.-colonel, by the captains and lieutenants of the sections and other masters and instructors :—

TABLE VI.

General Organization of the Physical, Military, and Technical Exercises (Engineers).

Subject.	Number of Hours.		Marks.
	1st Course.	2nd Course.	
Riding	162	150	9
Fencing	50	50	
Military Training—Theoretical and Practical Exercises concerning the Material, Manuals and Regulations of the Engineer Regiments and Commands (1)	308	266	10
Moral and Military Qualities	—	—	10

(1). This subject has great technical importance and embraces the study of railways, telegraphy, aeronautics, photography, etc., all of which are dealt with in the regimental manuals which serve as textbooks, and which I referred to in my previous article.

Digitized by Google

The students work in their classes from 7 a.m. to 11 a.m. and from 1 p.m. to 4 p.m. on week days, and part of Sunday is also spent either in the School or in outdoor work.

The course commences on the 18th October and ends with the examinations in the middle of July. The students of the first course then go into camp until the 5th August, and between the 6th and 21st August make an instructional tour to the engineer regiments other than those in Turin.

The memoirs written by the students as a result of these tours are taken into consideration in making the final classification.

The School contains the following establishments:—A museum of model room for Artillery and Engineers; an electrical laboratory; an excellent telegraph school, and a radio-telegraphic installation.

On the first floor is the officers' mess which is used by the professors and the artillery and engineer students. It contains a large anteroom (games of cards are forbidden), billiard room, library, and mess room. It is closed every evening at 10 p.m.

The unmarried professors, though they live outside the School (and the present colonel who acts as president), take their two chief meals at the mess daily, for which they pay 65 lire (£2 12s. 0d.) a month. Places at table are frequently changed.

One servant is detailed to every two students who are treated in every way as officers, which rank they hold.

On the second floor of the School there is a department completely isolated from outside noise. It consists of a wide corridor with a number of small cubicles on each side. These are the private work rooms of the professors and assistants. They each contain a writing table, drawing table, cupboards and bookcases where the work of the students, plans, etc., may be kept.

The detailed inspection of some of these rooms was a revelation to me and gave me great pleasure, as I there saw how the professors and assistants carry out their duties, the good order in which everything is kept, the scrupulous manner in which the work of the students is examined, and lastly the real communion which exists between the masters and their pupils.

The School also contains one covered and one open manège containing various jumps, a fencing saloon, and a splendid drill ground with guns and batteries for instructional purposes.

Gymnastics are not taught, a noticeable omission as the students at the Military Academy and lieutenants in regiments are constantly obliged to practice them; and it is all the more strange because the first thing the officers have to do on joining their regiments is to instruct the recruits and trained soldiers in this subject.

Conclusion.

I cannot claim to have given a complete account of the Artillery and Engineers of the Italian Army. Owing to want of space I have been unable to touch on such important subjects as the system of promotion,

Digitized by Google

and the tendency which is becoming every day more accentuated of specializing in different subjects, though the custom is still retained of lieutenants spending a portion of their service in the Sappers or Miners, Bridging Troops, Telegraph Troops, Railway or Special Corps, and the remainder in commands.

I think, however, that I have brought into prominence the following points:—

(1) The assiduous work which is done in all branches;

(2) The progressive evolution which, as a consequence, is brought to bear on the army and on the nation, and in virtue of which Italy is rapidly raising its name and influence in the concert of civilized nations.

'M.'

Digitized by Google

TELEGRAPHY OF PHOTOGRAPHS, WIRELESS AND BY WIRE.

(A *précis* of an article in *The Electrician* of April 20th, 1910).

(1). Introduction.

The methods of transmitting photographs and pictures by telegraphy can be classed as :—

(*a*) Purely mechanical, or
(*b*) Dependent on the physical properties of selenium, or similar substances, which are sensitive to the action of light.

The latter methods, although possessed of a higher scientific interest than the former, are at the present time the less practical, and are well-nigh obsolete. There is however every promise of their being made use of later.

The system of telegraphing photographs which will now be described, is that which has been employed by the *Daily Mirror* for over a year between Paris and London, and London and Manchester.

(2). General Principles.

The effect of an electric current is to discolour certain suitable electrodes, or to set free an element or ion, that can be used to form, with a second substance, a coloured product, which can be employed to produce marks on paper.

If a photograph image be broken up into lines which interrupt the current for periods depending on their width, these interrupted currents can be used at the receiving station to form coloured marks which join up *en masse* to form a new image.

In these line photographs, the light and shade of the picture is made up of masses of thinner or thicker lines with clear spaces between them. If this fact is borne in mind, the systems themselves will be found easy to understand.

(3). General Description of the System (*Fig.* 1).

A diagram of the connections is shown in *Fig.* 1.

The "transmitting drum" is a metal drum revolved by a motor at the rate of 1 revolution every 2 seconds. An iridium stylus (S_1) traces a spiral path over it in the same way as a phonograph. A half-tone photograph broken up into lines and printed in fish-glue on a sheet of lead foil is fixed on to the drum. As the stylus traces over this photograph, its contact with the metal base is interrupted every time one of the fish-glue lines comes underneath it, for a period varying with the

Digitized by Google

width of the line. Thus the transmitting instrument sends out a series of interrupted currents whose periods of duration are determined by the width of the lines composing the photograph.

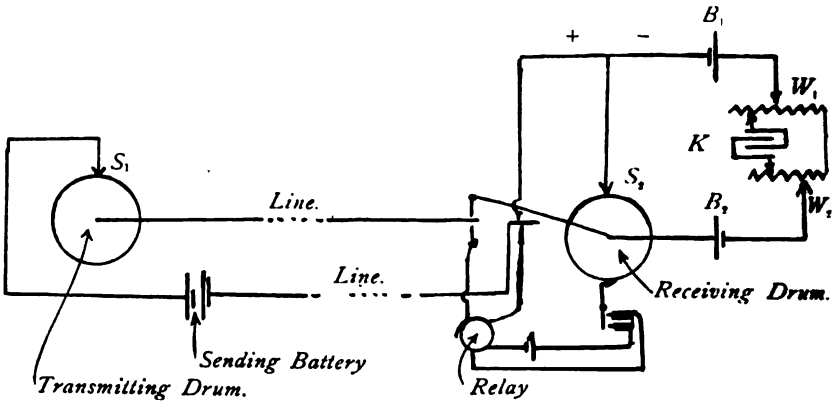


FIG. 1.

At the receiving end, a stylus S_2 is tracing an exactly similar path to S_1 on the "receiving drum," round this drum, however, is wrapped a piece of absorbent paper impregnated with a colourless solution which turns black or brown when decomposed by the electric current. Every brief current thus causes a mark to appear on the paper, and thus in time the photograph is reconstituted.

(4). PRACTICAL DIFFICULTIES.

The above is but a brief outline of the method, when it is tried in practice difficulties arise owing to the capacity of the lines. If a circuit be closed by a Morse key, assuming the time of contact of the key to be $\frac{1}{6}$th of a second, owing to the capacity of the cable, the time of discharge from it will be considerably longer than $\frac{1}{6}$th of a second. If the delaying effect of capacity be not got rid of when sending signals at the rate of 300 per second, it is easy to see that the result will be a hopeless confusion of overlapping marks.

The use of a "line balancer," a modified form of shunt as used in duplex telegraphy, which wipes out residuary currents from the cable, enables as many as 300 sharply defined chemical marks to be recorded in 1 second. This arrangement is shown in *Fig.* 1. The circuit containing the batteries B_1 and B_2, the two sections W_1 and W_2 of the 1,000 ohms resistance, and the variable condenser K forms the line balancer.

It is interesting to note that by increasing the voltage of the reverse batteries B_1 and B_2, considerably greater contrast can be obtained in pictures, and also, the finer the half-tone screen employed in splitting the photographs into lines, the higher the voltages of B_1 and B_2 must be.

The picture revolving beneath the tracer has to redraw itself, so to speak, on a piece of paper some hundreds of miles away. Each mark on the new picture must occupy a precisely similar spot on the new

Digitized by Google

paper, to that it occupies on the original drawing, *i.e.* the transmitting and receiving drums must revolve in perfect unison.

The method of synchronizing employed is as follows:—

The drums are revolved by means of motors running at 3,000 R.P.M., geared down considerably, so that the drums themselves revolve at 30 R.P.M. The motors are run off secondary batteries, and are run for a sufficient time to allow them to warm up, before a transmission is made. They are controlled by a regulating resistance in series with the field magnets, and their speed is ascertained by means of a frequency meter. The receiving drum is revolved a little quicker than the transmitting one, and consequently finishes its revolution before the latter. It is then stopped by a steel check, and obliged to wait until the transmitting drum has caught it up. A fleeting contact then comes into play, a reverse current is sent to the receiving instrument, is led into a polarized relay, and actuating an electro-magnet releases the drum by removing the check. Both drums thus start off in unison, every revolution. Both motors should be run off batteries of the same ampère-hour capacity.

(5). Advantages of this System.

(*a*). The whole operation is in view, and by watching the marks on the drum, and by altering the sliding resistances, the operator at the receiving end can get a perfect reproduction.

(*b*). The transmitting drum can be used as a receiving drum.

(*c*). An apparatus is now ready which can be used equally well for line or wireless work.

B. WIRELESS TRANSMISSION,

(6). Description of Method.

The connections for wireless transmission are shown in *Fig.* 2.

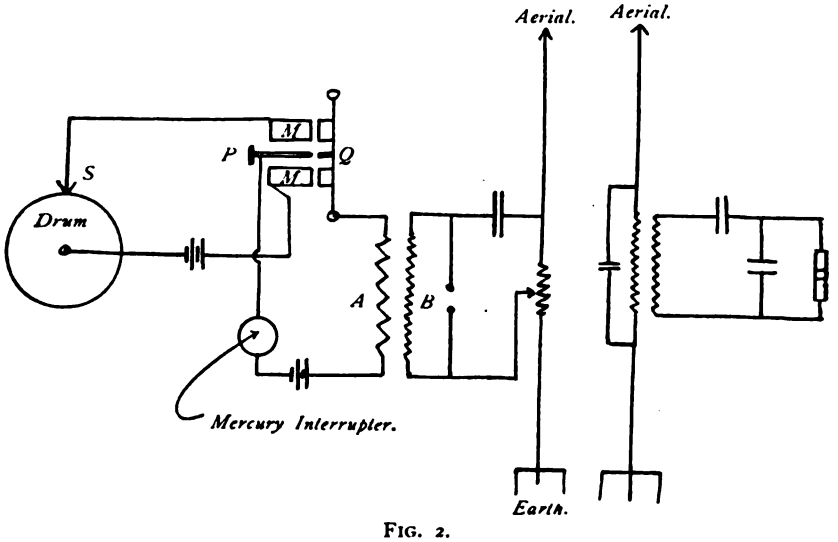


Fig. 2.

Digitized by Google

The action of the apparatus is as follows:—The line photograph is attached to the transmitting drum, the intermittent current then passes to the electro-magnet M, which attracts a soft iron diaphragm attached to two brass springs, which are fixed to two rigid supports. This attraction causes the platinum points P and Q to be brought into contact. When the current flows, and P and Q are in contact, the primary circuit is closed. The secondary circuit is inductively coupled to it, and thus a signal is sent into space, as in ordinary wireless telegraphy.

When working at high voltages in the primary circuit, such as 110 volts, arcing is liable to take place. By using a mercury motor-interrupter in the primary circuit, it was found however that this difficulty could be got over to a large extent.

The receiving apparatus depends for short-distance work upon a coherer cymoscope, with a decohering apparatus of a particular character, which is shown in *Fig.* 3:—Every time an oscillation passes to the antenna, the coherer becomes conductive in the ordinary way, and the relay R (*Fig.* 3) is actuated. This relay is connected to the electro-magnet EE,

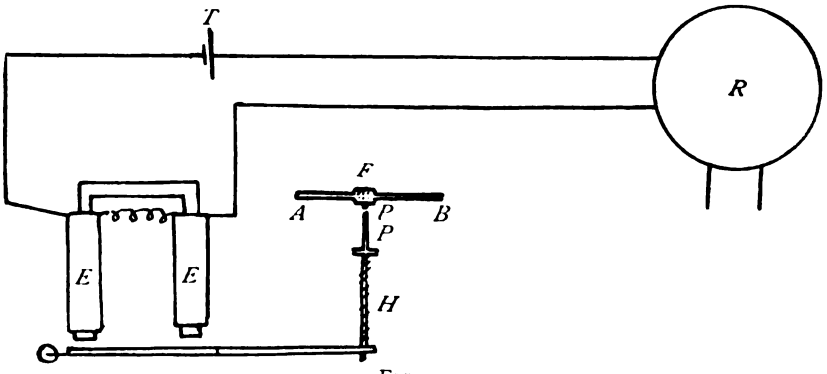


FIG. 3.

and causes it to attract the armature MN, which in moving towards the magnet poles brings the resilient hammer H, with a platinum point P, into contact with the coherer AB. The coherer being fitted with a collar F, and a contact pin, the act of striking it with the hammer, not only decoheres, but also closes a local circuit, and so causes a black mark to appear on the chemical paper In this way, successive marks can be obtained on the paper in ·017 seconds.

(7). LIMITATIONS OF THE WIRELESS METHOD.

(*a*). So far it can only be used for distances up to about 50 miles.

(*b*). Only sketches of a simple character can at present be transmitted, it would however be very useful for transmitting line plans or written messages.

(*c*). Its great advantage is that the message cannot be tapped, as the reception of the plan depends on (1), the possession of exactly similar sets at the receiving and transmitting ends; (2), absolute synchronism. A variation of 5 per cent. to 10 per cent. in the rate of running is sufficient to make the message unreadable.

Digitized by Google

(8). Synchronism.

In wireless work, the question of synchronism is more important than ever. Two methods are employed, both are satisfactory.

In the first method both the drums are made to revolve too fast, *i.e.* they revolve once in $4\frac{3}{4}$ seconds instead of a nominal 5. They are then stopped by a check till the 5 seconds are completed, when they are simultaneously released. *Fig.* 4 shows this form of synchronizer. It

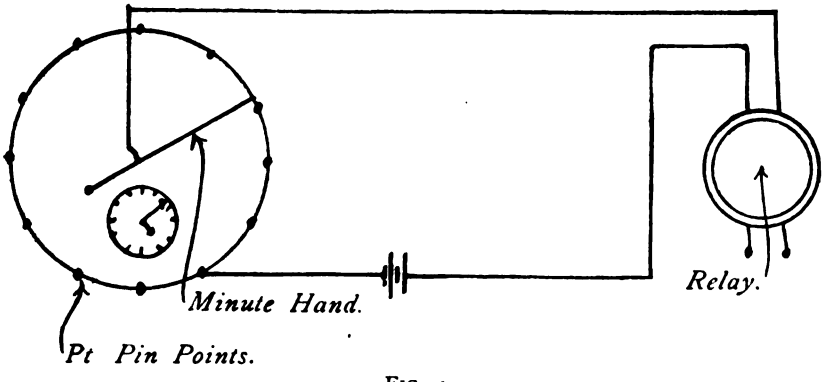


Fig. 4.

consists of a chronometer with a long minute hand, at the end of which there is a fine bundle of platinum wires. These wires rub every 5 seconds against platinum pins set round the circumference of the clock face. The pins are connected to one side of a battery, and the minute hand and a relay to the other. To this relay is connected a local circuit containing an electro-magnet, which draws back the check that retains the drum, and thus at the end of every set of 5 seconds the drum is free to revolve again. By selecting well-calibrated clocks, it is possible to get the two ends into perfect synchronism. This is the system which is being used in practice.

The second method of synchronizing the two stations is controlled by electro-magnetic oscillations. As however it is only useful over short distances, it is not described.

A. H. Scott.

Digitized by Google

REVIEW.

THE Review which appeared in the February number of the *Journal*, page 150, should be "Notes on Austrian Field Telephones" and not German as stated.

BOOKS RECEIVED.

THE WORK OF THE ROYAL ENGINEERS IN BRITISH COLUMBIA, 1858 TO 1863. By His Honour Frederic W. Howay. The King's Printer, Victoria, B.C., 1910.

ARMY ORGANIZATION AND ADMINISTRATION. A Study of the Subject by Capt. H. L. Pritchard, D.S.O., R.E. Wm. Clowes, 23, Cockspur Street, S.W. London, 1910.

THE RIFLE IN WAR. By Capt. Henry E. Eames, U.S. Infantry, Instructor, Army Service Schools. U.S. Cavalry Association, Fort Leavenworth, Kansas, 1909.

MILITARY HISTORY APPLIED TO MODERN WARFARE. A guide to the Study of Military History exemplified by Studies of the Campaigns of Austerlitz, Jena, Vimiero, Corunna, Salamanca, Waterloo, and the Shenandoah Valley by the late Capt. J. W. E. Donaldson, R.F.A., *p.s.c.* Second Edition. Revised and Enlarged by Capt. A. F. Becke, late R.F.A. Hugh Rees, 119, Pall Mall, S.W., 1907.

CO-ORDINATE GEOMETRY APPLIED TO LAND SURVEYING. By Woodford Pilkington, M. INST. C.E. E. & F. Spon, Ltd., 57, Haymarket, London, 1909.

ACTIVE SERVICE POCKET BOOK. Fourth Edition. Enlarged. Lieut. Bertrand Stewart, West Kent (Queen's Own) Yeomanry. W. Clowes & Sons, 23, Cockspur Street, London, S.W., 1910.

Digitized by Google

NOTICES OF MAGAZINES.

Revue Militaire des Armées Étrangères.

(1). The Italian Army Manœuvres, 1909.—A detailed daily account is given of these operations, which lasted from the 26th August to the 2nd September and in which 4 infantry and 2 cavalry divisions took part.

The following is a *résumé* of the report on the experiments made :—

(*a*). *Cyclist Battalions.*—Two cyclist battalions each of 3 companies (6 officers and 150 men per company) were employed with the cavalry divisions. Ten motor cyclists and 1 motor car were attached to the headquarters of each battalion and 3 motor cyclists to each company. Three companies of volunteer cyclists (3 officers and 75 men per company) were also employed. They were mostly composed of men of less than 20 years of age.

(*b*). *Machine-Gun Sections.*—These were allotted in the ratio of 1 or 2 per infantry brigade, and 1 per cavalry brigade. Their composition was as follows :—

Infantry machine-gun section :—
- 1 officer.
- 18 men.
- 7 animals.
- 2 machine guns.
- 10 panniers to carry ammunition.
- 15,000 rounds on bands.

Cavalry machine-gun section :—
- 1 officer.
- 22 men.
- 34 horses (24 riding horses and 10 pack).
- 2 machine guns.
- 16 cartridge panniers.
- 12,000 rounds on belts.

(*c*). *Motor Cars.*—41 motor cars; 34 motor bicycles and 27 heavy motors were employed. Each driver or cyclist was provided with a book containing :—

(1). Information about the vehicle and its driver.
(2). Leaves on which to record the daily journeys.
(3). Warrants for the issue of benzine, petrol, oil, etc.

Digitized by Google

(*d*). *Supply Service.*—Much use was made of motor transport for the supplies of troops. The daily ration of each man was :—

250 grammes of meat.
200 grammes of bread or rice.
15 grammes of bacon.
And either 2 rations of 10 grammes coffee and 15 grammes sugar.
Or 1 coffee ration and $\frac{1}{4}$ litre wine.

(*e*). *Field Kitchens.*—These consisted roughly of large boiling pots with a grate underneath them. They were not mounted on wheels but were carried in the battalion carts. Their capacity was 60 meat rations (60 x 250 grammes), 20 litres of water and 40 rice rations. Five were allotted to each group of 2 companies, and thus 300 meat or 200 rice rations could be supplied.

(*f*). *River Ambulance.*—This consisted of 10 boats; 7 hospital ships and 3 tugs and could accommodate 214 men. A Berkenfeld filter on each boat enabled the river water to be used for drinking and cooking purposes. The drinking water was, however, boiled after passing through the filter.

(*g*). *Automobile Searchlight.*—The motor car carried a dynamo, and dragged a two-wheeled limber on which was placed the projector. The maximum distance allowed between engine and projector when in action was 200 metres; 2,500 metres the limiting range of the light.

(*h*). *Infantry Telephone Sections.*—These consisted of 4 vehicles carrying 40 kilometres of wire. The wire weighed 5 kilogrammes per kilometre, was rolled up in drums weighing 6 kilogrammes each. For unwinding; these drums were placed on men's backs. The *Tribuna* stated that good results were not obtainable owing to the difficulty of hearing whilst firing was going on.

(*i*). *Wireless Telegraph Stations.*—Three W.T. stations of a range of 100 kilometres were employed and found to be most satisfactory. They were attached as follows; one to the Directing Staff and one to each side, and were nominally employed to maintain communication between the Directing Staff and either side.

(*j*). *Other Experiments.*—Experiments were made with :—(1). A new pattern of ambulance wagon. (2). Field searchlights. (3). A new bridging equipment. (4). A sandbag for individual protection. (5). A new form of footgear; but no details are available.

MILITARY NEWS OF DIVERS COUNTRIES.—*Austria.*—Each infantry and rifle battalion now possesses :—Four telephone stations and 6 kilometres of wire; sixteen flag stations (for day work); eight lamp stations (for night work); four of these are petrol lamps having a range of only 8 kilometres and four are acetylene lamps with a range of 15 kilometres.

Germany.—The Infantry Training Manual has been revised. It has been brought up to date on the following subheads :—

Digitized by Google

(1). *Manœuvring Formations.*—Much of the old-fashioned drill is abolished and the use of signals increased.

(2). *Night Operations.*—The importance of night operations and of night digging is insisted upon. "The reconnaissance of the enemy s position is also to be carried out at night."

(3). *Employment of Machine Guns.*—The use of machine guns in the attack is to assist the infantry by their fire, which must be kept up even during the final assault. Flanking and commanding positions offer special opportunities to machine guns.

(4). *Action of Infantry in the Presence of Entrenched Positions and Shielded Guns.*—The effect of shielded guns is that even at close ranges infantry have no fire superiority over artillery unless they can make use of oblique fire.

The distance at which to deliver the assault is reduced from 150 to 100 metres.

Russia.—In consequence of the introduction of the 3 years rule in the infantry, it has been made possible for men to get their first stripe after one year's service instead of two as formerly.

A fortress engineer brigade has been formed at Vladivostock consisting of:—Four companies of sappers; four companies of miners; one company of telegraphists; one balloon company; one wireless telegraph station; one carrier pigeon station.

The number of officers allowed to undergo the balloon course at St. Petersburg, from the 1st December to the 1st October has been increased from 4 engineer and 4 garrison artillery subalterns to 26 engineer and 4 garrison artillery subalterns.

Turkey.—The adoption of 4-gun batteries has been decided upon.

Reserve officers are to be obtained from two sources:—(*a*) Retired officers of the regular army; (*b*) young men who have taken their degree and desire to become reserve officers. The latter serve for a year. At the end of each six months they undergo an examination and are successively promoted to the ranks of corporal and sergeant. For the next 2 years they serve 8 weeks per annum and are made first of all sergeant-majors and then second lieutenants of the reserve. Thus at the end of 3 years it is possible for them to get their commissions. Backward candidates may however have to wait as long as 4 years.

The 1st Army Corps has been reorganized as follows:—Infantry.—2 divisions (each of 16 battalions and 1 rifle battalion). Cavalry.—4 regiments. Artillery.—6 regiments. The minimum length of service in each rank has been fixed as follows:—Second lieutenant, 3 years; lieutenant, 4 years; captain, 4 years; vice-major, 4 years; major, 5 years; lieutenant-colonel, 5 years; colonel, 5 years; brigadier, 4 years; major-general, 5 years; lieutenant-general, 4 years. The law has a retrogressive effect, and officers who hold too high a rank are put back to that rank which they should hold according to their length of service.

A. H. Scott.

Digitized by Google

RIVISTA DI ARTIGLIERIA E GENIO.

February, 1910.

THE DOMINION OF THE AIR IN WAR.—A long and interesting article by Capt. Ottolenghi of the General Staff, discusses fully the above subject. The characteristics of aerial navigation vary with the height to which it is intended to ascend, the time during which it is proposed to remain in the air, the length of the journey, the weight that has to be carried, and the velocity; all these opposite and contradictory elements causing embarrassment when deciding which is the best among the various dirigibles (rigid, semi-rigid, elastic), and the many aeroplanes (mono-bi-tri-multiplanes) with and without tails, helicopters, etc., now constructed or proposed. It is also necessary to consider other important requirements which cannot be calculated, such as safety when manœuvring, fittings for transport, etc., etc. Of all these elements, the most important is velocity.

The velocity of an airship depends essentially on its form—adapted more or less to overcome the resistance of the air—on its motors, propellers, and, in a subordinate manner, on its transverse, longitudinal and vertical stability; since rolling or pitching movements are not only inconvenient and dangerous, but are also obstacles to the complete fitness of the machine. The velocity is a quality which costs dear—as the necessary power for increasing the velocity increases with the cube of the velocity. Consequently, to double the velocity, it is not sufficient to double the motor power but it has to be increased eight times.

On the other hand increasing the motor power means increasing the cubic content of the balloon. For instance, in doubling the linear dimensions of a balloon the superficies offered to the resistance of the air is increased four times, while the volume of the balloon is increased eight times. The greater volume, also, although it admits of a greater velocity, requires a more powerful motor. On the whole the larger dirigibles have an advantage over smaller ones.

Greater volume moreover means greater capacity for transport, which is a very important matter in the employment of military dirigibles.

Take for example a dirigible with a volume of 3,000 cubic metres and a total transportable weight of about 1,000 kilogrammes, of which 500 are explosives and 500 useful weight. With two motors each of 60-H.P. it will travel with a velocity of 60 k.m. an hour, consuming 50 k.g. of benzine an hour. In 10 hours it would travel 600 k.m.

If instead of two motors only one be used, the propulsive force would be reduced to 60-H.P., and the velocity would be reduced to 48 k.m. per hour. But since the hourly consumption of benzine would be 25 k.g. only instead of 50, the motor could work for 20 hours instead of 10. The velocity and the capacity for transport therefore are the essential characteristics of the dirigible, and all the others are subordinate to these, and the possibility is not remote of constructing airships capable of transporting a certain weight of material, with great velocity, for long distances and at variable heights.

Digitized by Google

It may be believed that in the near future, the art of war may reckon on the assistance of new means of action represented respectively by :—

(1). Large dirigibles, with a velocity certainly more than 50 k.m. per hour transporting men and materials, and capable of sustaining themselves in the air at great heights, and of accomplishing long journeys.

(2). Aeroplanes, which will carry two persons or more with a velocity exceeding 50 k.m. per hour, manœuvring easily and regularly and capable of performing very long flights.

The advantages and the failures likely to occur in endeavouring to drop explosives from dirigibles on fortified places, bridges, etc., are fully discussed. If shells of a spherical shape are used they must be exactly spherical and the exact coincidence of the centre of the shell with the centre of gravity is not so easy to obtain, as with a hollow shell filled with an explosive the density is naturally different from that of the external casing.

Instead of spherical shells it has been proposed to use oblong shells, but it would be difficult to ensure that the shell would start with its axis perfectly vertical, and still more difficult to prevent it from overturning during its descent through the air.

Besides this, the dirigible could not remain perfectly stationary owing to the wind, so that it would be very difficult if not impossible for the rain of explosives to be effective. The dirigible would also be exposed to the fire of quick-firing guns, mitrailleuses, and even rifle fire and would have to contend with other aerial ships. For reconnoitring purposes the assistance of dirigibles and airships will be of the greatest value.

Both Moltke and Clausewitz hold that uncertainty is the greatest obstacle in war, and dirigibles and aeroplanes will serve effectually to lessen this obstacle.

During the recent military operations at Casablanca a captive balloon was largely employed. But the captive balloons can only ascend to 400 or 500 metres owing to the weight of the cord which diminishes the lifting power. Its utility also is limited, as it is only able to examine objects comparatively near. Observations from captive balloons are not easy to take. The observer, unless experienced, easily loses his bearings and fails to give the information which is looked for and anxiously awaited.

The airships will do away with all these inconveniences. They can ascend to four times the height allowed for the anchored balloons, are able to move in any direction, can approach their objective under the most favourable conditions, and the vertical vision in space is much clearer than when inclined. Their advent, if it does not radically change the operations of war, is certainly destined to influence them to a great extent.

During the period of mobilization, they will rapidly traverse the enemy's country, taking account of his dispositions and giving the most useful information as to his communications. Not only will they give information as to the armies, but also with regard to all the enemy's country and his preparations for the strife.

During the combat they will be able to determine the exact development of the enemy's front; his initial movements, and the direction of the various columns on the march.

Digitized by Google

It does not seem possible to foresee what will be the developments and phases of the battles of the future in which airships are used on a large scale. What might have happened at Gravelotte in 1870, if at the commencement of the action the Germans had learnt, by means of an aeroplane, of the extension of the right wing of the French line of battle? It was ignorance of this extension that cost such sanguinary losses to the Guards and the Saxons when the fortunes of the day remained undecided until nightfall. And what might have happened at Mukden if a dirigible had prevented the Russian reserves from uselessly wasting their energies from the right wing to the left wing of an immense battle front, by signalling the information that the army of Nogi, posted behind the army of Oku on the left of the Japanese line of battle, was ready to advance.

March, 1910.

REVIEW OF BOOKS AND PERIODICALS.—*On the Construction of Walls for Docks and Landing Stages on Muddy Foundations.*—By E. Barberis, Major of Engineers.—This very important study on the construction of walls for docks resting on mud foundations, has been published by permission of the War Minister, and is well worthy of attention on account of the author's long and practical experience of naval works and arsenals.

The publication is issued at a very favourable time, not only on account of the increase of commercial activity in the principal Italian ports, but also because of the feeling of all the nations that suitable docks for ships of war are more urgently needed in the military ports. Consequently a book which explains the difficulties to be met with in special constructions of this kind, will be of the greatest use to the engineers employed. Major Barberis' work contains the results of numerous researches and observations, and refers amply to the results obtained from the experience of eminent naval architects. The difficulties that are met with—especially in the construction of walls for docks on foundations of mud such as Brest, Bordeaux, Trieste, Kidderpore, Belfast, etc.—are fully examined.

The author describes the works now in course of construction for the docks in the military port of Spezia. Having with the aid of borings found soft mud to a depth of more than 30 metres and not being able to change the locality, the same measures were adopted as at Trieste, the latter being described by the Engineer Bömches in the *Memoires et compte rendu des travaux de la société des ingenieurs civils.*

At the same time the author gives numerous observations and data for following minutely the movements of walls and of sand banks at their base, and studies the peculiarities of improvised foundations.

Describing the results obtained by the same methods as those adopted at Trieste, the author is in favour of a new system which completely overcomes the difficulties met with, both technically and economically.

The system consists of the employment of great improvised beams, which are drawn out after the walls are constructed, and which are only required during the construction and settlement of the walls. It was found formerly that if the beams were of iron the action of sea water corroded them and rendered them almost useless.

Digitized by Google

These beams guide the successive stages of the walls in their foundations, preventing any errors in the alignment which might otherwise occur from time to time and necessitate the partial reconstruction of the work.

The middle beams permit of the work being proceeded with in safety, without being affected by any sinking of the walls due to the movements of the external sand banks.

The movements of the external scarp walls are definitely regulated and the movements cease, so that after about four or five years the middle scarp walls perform the same office as the beams did during the sinking of the foundations.

By this system, it is hoped that the safe construction of docks for great modern ships may be assured by long walls constructed on mud foundations, whatever may be the depth and the scouring.

The volume contains 31 plates illustrating the descriptions of the various works, and is sold at the price of 5 lire to the public, and at 3 lire to the military offices of administration.

MOTOR CARS IN THE ARMY.—*Reinforcing the Ammunition of Field Artillery.*—Similar reasons may be given for this service as for the ammunition required for rifles. The average daily consumption of field artillery ammunition from the data obtained during the war in the Far East in the Japanese Army was as follows :—

At Yalu (20th April) the 2nd Artillery Regiment fired 26 rounds per gun.

The Regiment of Artillery of the Guard, 23 rounds per gun.

At Nanshan the 1st Division fired 180 rounds per gun.

" " 3rd " " 206 " "

" " 4th " " 101 " "

At Wafangu (14th June, 1904) 6 batteries fired an average of 83 rounds per gun.

At the passage of Fisciulin (17th July) 1 battery fired 59 rounds per gun.

At Simatcen (31st July) 2 regiments (72 pieces) fired 93 rounds per gun.

At Motienling (17th July) 1 battery fired 34 rounds per gun.

At Fauzelin (31st July) 6 batteries fired 25 rounds per gun.

At Sha-ho (27th October) the guns fired on an average 43 rounds each.

At Mukden (2nd March) 3 batteries fired 189 rounds per gun.

In the war of 1870–71 the consumption of ammunition for the field artillery was as follows :—

At Mars-la-Tour (16th August) 15 batteries of the IIIrd Corps fired each 768 rounds, or 128 rounds per gun ; while 2 batteries fired 194 and 191 rounds per gun.

At Saint Privat and at Gravelotte (18th August) 10 batteries fired on an average 274 rounds each, or 46 rounds per gun ; and one of these 852 rounds, or 142 per gun.

Each of the batteries of the Xth Corps fired during the days of the 16th and 18th August on an average 262 rounds during the day, that is 43 per gun ; only one on the 16th August fired 1,048 rounds equal to 175 rounds per gun.

Digitized by Google

The average of rounds fired by the IXth Corps on the 18th of August was 526 per battery, or 88 per gun.

At Sedan the batteries of the Vth Corps fired 390 rounds, or 65 per gun; those of the XIth Corps 500 rounds, or 83 per gun, and of these one fired 731 rounds, or 122 per gun.

It should be mentioned however that in many of the combats the German batteries felt the deficiency of reinforcements: and this was owing to the difficulty of supplying the ammunition to the various columns. Some of the batteries suffered such heavy losses in men and horses that they were unable to carry out the filling of the ammunition boxes.

We see from the average daily consumption by a great group of artillery that it is necessary to allow for somewhat less than 100 rounds per gun, and considering the modern improvements in guns, and the increased speed in loading of the guns now in use over those of some years ago, we may say that 100 rounds per gun should be allowed for.

In an army corps of two divisions there are 96 guns, so that an allowance of 100 rounds is necessary per gun for which 30 wagons would be required for transport to a distance of 100 k.m.; but making a reduction of one-third for the reduced distance of transport the number of wagons required would be 20.

The author recapitulates what he has written in this and in former numbers of the *Journal*, the results obtained showing that in order to provide for a daily reinforcement of ammunition and provisions for an army corps of two divisions—that is to say for an army fighting every day and consuming its reserve provisions—6 motor cars would be required for these provisions, 18 for the supply of rifle ammunition, 20 for that of the artillery; in all 44 motor cars.

The author enters very fully into all the details of the important question of the supply of ammunition and provisions to armies in the field. Excellent diagrams and tables are also given, showing the amount of ammunition supplied during the different battles in the Far East and also the consumption, and the length of the journeys made in effecting this supply.

April, 1910.

FORTRESS WARFARE IN THEORY AND PRACTICE.—Among the numerous studies which of late years have been published on siege warfare, one very deserving of note is that of Lieut.-Colonel Frobenius, *Kriegsgeschichtliche Bespiele des Festungskrieges aus dem deutsch-französischen Kriege von*, 1870–71, the 12th volume of which has lately been published. This last volume is particularly interesting as it contains a collection of valuable studies deduced from historic examples, such as those of the memorable Siege of Port Arthur, which tend to solve problems of attack based on modern requirements.

The ideas proposed by Frobenius relating to the strategical part of fortress warfare are almost exclusively drawn from the experience of the war of 1870-71, and he naturally enters into the field of high strategy and the conduct of a war, which are always closely allied with high politics.

Digitized by Google

The author premises some considerations on the fortifications of the country which are generally designated by him as "assurances of possession." He asks: "What is to be assured by these fortifications?" and replies concisely "The gates of communication which are the heads of the vital arteries of the country."

Accepting for the moment that it is necessary to construct fortification for a country, Frobenius is opposed—and rightly—to improvised fortifications, which strategically, tactically, and technically can only be a poor substitute for fortifications prepared and organized in time of peace.

Concluding his remarks on the fortifications of a country, after considering historic examples of "Conglomerates of ancient and incomplete works with uninstructed and undisciplined garrisons (Landsturm), with hastily collected firearms of old and unserviceable patterns, with commandants advanced in age and inefficient," he adds "These are times of the past. In fact things have changed and the combatants now are confronted with organization suitable to modern times and fully efficient."

Moltke in his *History of the Franco-German War of* 1870-71 designated the 1st September as the characteristic date of the entire campaign, because of the situation after the Battle of Noisseville before Metz: "On the same day and at the same time at which one French army was annihilated at Sedan, the other retired within Metz and was hopelessly imprisoned." "To annihilate" and "to paralyze" the field army was Moltke's war scheme, he doubted not that the condition of the army at Metz would in the end lead to its annihilation, as at Sedan, provided that the lines of investment remained impenetrable.

From the method by which the head of the German Army conducted the war before Paris it is clear that he always held the fixed idea of carrying on the field operations, also, in the second part of the campaign. Moltke did not conduct the war against fortresses but against the field army, so that the latter should be compelled to retire within the fortresses and to abandon the field to its adversary.

The conduct of Moltke before Metz and Paris never had the fortresses for its objective. Such a motive may have existed only at Strasburg and for the Alsatian fortresses, where it was necessary to keep free the railway communications for the field army that was pushed forward into the enemy's country.

The author in his work avails himself both of the experiences of the war of 1870-71 ending with Belfort and of those of the Siege of Port Arthur and he also refers to several writers (Müller, Rohne, Fritsch, etc.) and to the old master Vauban.

In military history it is difficult to find two examples of sieges which, in their preparation and in their conduct, present greater contrasts than Belfort—the type of siege warfare of 1870-71—and Port Arthur.

Frobenius discusses very fully the tactics of the attacking artillery during the war of 1870-71, but says nothing of the engineers or the pioneers.

He imagines a great modern fortress, and treats especially of the necessity for the armed forces of the besieging army being fixed at three times those of the besieged, calculated at the rate of one man per metre

Digitized by Google

on the principal lines of defence (50 k.m. of circumference). There are then 150,000 men equal to 10 divisions, without counting the detachments of siege artillery and the technical troops.

The attacking forces would occupy an extended position of 75 k.m.; with 500—600 guns, and a corresponding space of about 10 k.m. for the camp of the besiegers. For this, 3 divisions more would be required with one more as a reserve, leaving 6 divisions for 65 k.m. of investment or about one man and a-half per metre.

What an extensive front compared with the preparations for fortress warfare in 1870–71! Of the siege park for the technical services and of the relative advance-guard, nothing is said.

The author however assigns to the superior in command the arrangements for the preliminary dispositions, and thinks that the said commander, or his chief of the staff, accompanied by the commandant of the siege artillery and the general of the engineers and pioneers, should make with the cavalry a rapid reconnaissance of the fortress as far as the dispositions of the garrison would permit.

According to Frobenius, the position for the final assault should be found at a distance between 250 and 350 metres from the objective. He assigns the latter distance as the maximum, and dwells upon the advantages of pushing forwards the approaches to a point where the besiegers will not run any risk from their own artillery (250 metres).

However this may be, Port Arthur has only confirmed what was known from Sebastopol, in that in face of an energetic defence, the attack would require to carry on its approaches to the brow of the counterscarp if it wishes to be secure of success.

From the idea that the counterscarp can only be destroyed by the work of the pioneers—*i.e.* by mines—as was held up to the time of Vauban, must be subtracted the effects of modern artillery. Even then the works for the defence of the ditch, the most dangerous for the assault, would remain. If these have resisted the effects of the artillery the pioneers would doubtless find these the most difficult of its duties. And where these defensive works of the ditch are protected by countermines, the assailants are constrained to a war of mines, which would offer special and difficult characteristics to the technical work of the sappers and pioneers.

EDWARD T. THACKERAY.

THE YAMATO-DAMASHII.

The Yamato-damashii or *Spirit of Japan* is the title of an official magazine issued monthly, of which the first copy appeared on the 1st January, 1910.

Its object is "To lead humanity to true happiness."

The text is printed in Japanese character with an English translation below, undertaken by Mr. J. Inouye, First Secretary of Legation, and Professor T. Okada of the Military Staff College.

Digitized by Google

Each number of the magazine, as a rule, opens with an Ode by His Majesty the Emperor, expounded by Baron Takasaki, followed by an Ode by Lord Nisshin, expounded by Admiral Togo, and usually General Count Nogi contributes an article.

The magazine is issued in close connection with the "Shiyūdan," or Military Education Society, which exists for the fostering and development of Yamato-damashii and Bushido, or the propagation of military spirit and ideas.

The *Times* Book Club is the sole agent for the magazine in Europe, and the yearly subscription is 10s. post free. The whole magazine is so patriotic and excellent that I am sure that it only requires to become known for every Officers' Mess to subscribe to it, and undoubtedly its presence in N.C.O.'s Messes and Soldiers' reading rooms would tend to inculcate *morale* and discipline to the troops of any nation. The Magazine is charmingly got up, is printed on paper of very light weight, with a small colour print of a spray of cherry blossom on the cover, and each number contains a colour print illustrating some incident in the life of some humble exponent of the principles of Bushido.

No obstacles will be able to restrain the growth of a nation imbued with the ideas portrayed in this magazine, and it lays bare the source from which is derived the patriotism and martial spirit of the Japanese troops so clearly shown in the late war.

Some extracts translated and published in the June number from Count Okuma's *National Reader*, show that the lofty aim of the Japanese Nation is to become the harmonizer of Oriental and Occidental civilization:—"Just as the sun breaks forth from clouds and sheds its light around, so it shall be our highest ideal to become a leader of the peace of the world and a guardian of humanity." The context shows that by "humanity" Count Okuma means that all men and all nations shall love one another irrespective of race or creed.

The biographical sketches are all so interesting and well told that it is difficult to select from which to quote extracts. I cannot however refrain from giving an extract from the life of Lieut.-Colonel Tachibana. "When appointed a company commander of the Training Battalion at the Toyama School, he would leave home before daybreak and reach his company before the hour for getting up, and then he would, before breakfast, himself teach fencing and bayonet exercise to such of the Non-Commissioned Officers and Privates, as desired to learn. He was always the first to commence the day's work, and when it was concluded he would study the work for the following day. He would write the record of that day's educational work, and seldom went home till after dark, and when he reached it he invariably wrote his home diary. His house on Sunday, we are told, looked like the soldiers' club. As Lieut.-Colonel in command of the 34th Infantry Regiment at Shoushanpu, wounded in a brilliant assault and carried to a trench by a Sergeant, when asked to go to the rear and have his wound dressed he replied:—'This is an important position which we have captured by sacrificing many of our men. If I die here I shall be content, and I shall not move a step from it. Only I feel infinite regret and sorrow that on this the birthday of His Highness

Digitized by Google

the Crown Prince, I should have lost so many of my brave men.' He bowed to the Eastern Sky and weeping breathed his last."

Again take the story of Hara Soemon's Mother :—

Hara Soemon as a lad, setting out to take part in a plot to avenge his late Lord's death, longing to tell his Mother before he left home, refrained for fear his younger brother would hear and his tongue might slip. After half a day's journey, whilst eating the rice cakes made for him by his Mother, he threw a morsel to a pigeon who at once took it up to her nest and gave it to her young.

Touched by this he turned back and returned to his home and told his Mother asking her to be resigned to his death. His Mother encouraged him and praised him, (Was she not a Samurai's daughter?) and he stayed the night.

Next morning going to call his Mother he found that she had died by her own hand and by her side was the following letter :—

I cannot express in words how dutiful you have always been to me and in your latest act you have shown more than ever your dutifulness. If you think so much of me as to come back 17 miles to see me again, I am sure that when in the attack on Lord Kozuke-no-suke's mansion you should happen to think of me, the courage to advance would fail you and you would show your back to the enemy. Feeling that such an act would be due to my being alive I quit the world in advance to-night. You will then have no cause for anxiety. If you go to the attack with the thought that Kozuke-no-suke is the enemy of both your Lord and your Mother the edge of your sword will grow keener than ever, and you will distinguish yourself in the fight. This is the greatest source of pleasure to me. As I am in haste to die I leave many things unsaid. Please remember me to Sozaburo.*

YOUR MOTHER.

In the February number there appears a translation of the "Imperial Precept" given to the Imperial Japanese Troops in 1882. This sums up the whole art of soldierly virtue and national patriotism in a few words.

Many of the tales related in the magazine show the effect that this Imperial Precept has produced and still produces on officers and men and on the nation at large.

The January number contains the translation of an Imperial Rescript on Education, written in 1890.

The future of a Nation undoubtedly depends on education and the Japanese nation with that unity of national purpose which so rightly distinguishes them, has recognized this more fully than other nations.

Morale and patriotism are natural instincts, but without encouragement they die an early death or become so stunted that they are of little value.

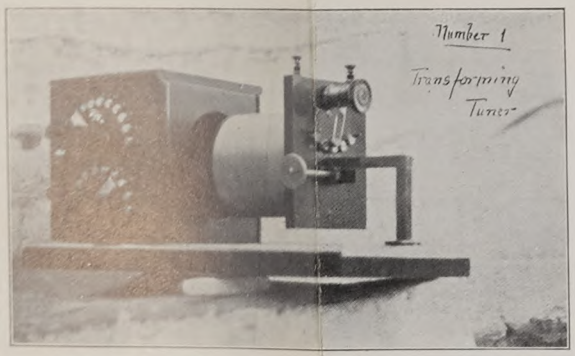
The Yamato-damashii is the unwritten law of an English public school taught to a whole nation.

"C.F.R."

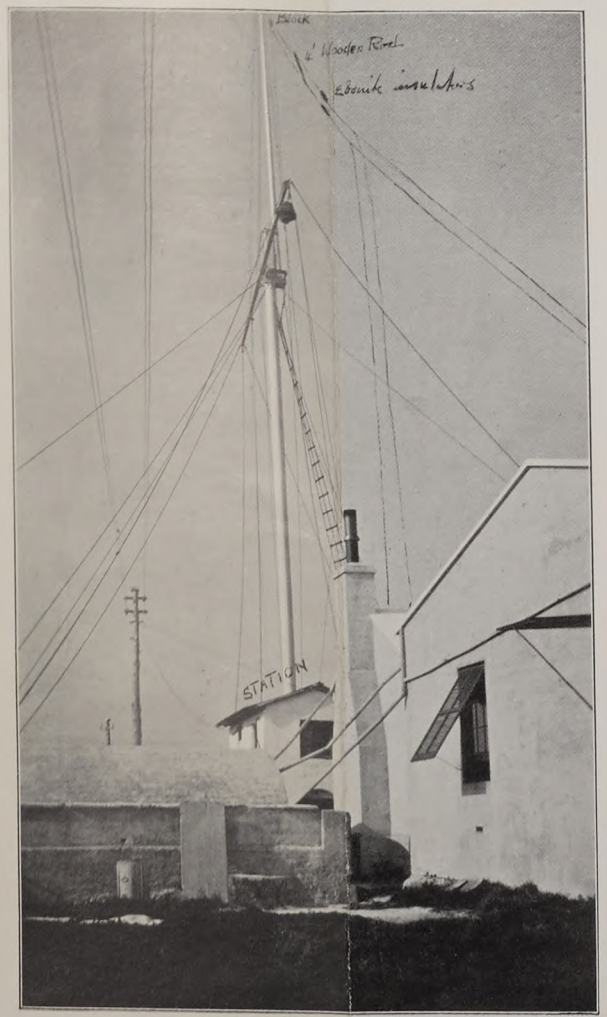
* His younger brother.

Digitized by Google

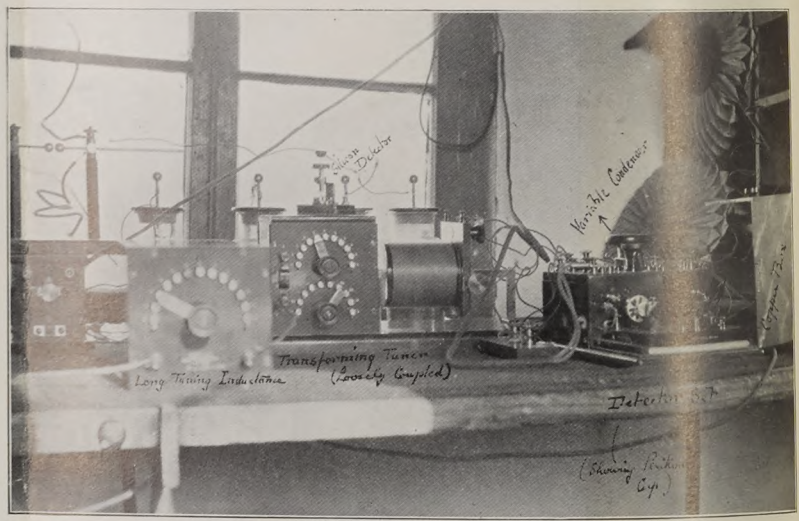
Digitized by Google



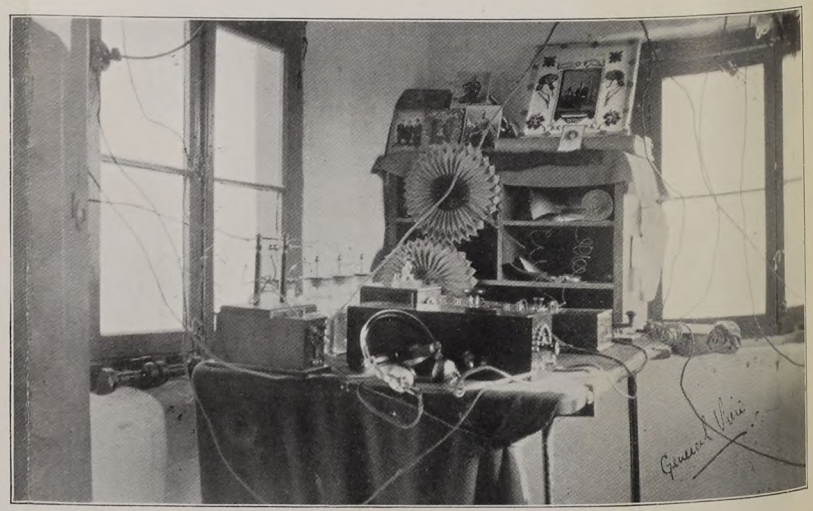
Transforming Tuner.



Aerial (on right of Flagstaff).



General View of Receiving Instruments.



Interior of Station.

Digitized by Google

WIRELESS TELEGRAPHY.

SOME UP-TO-DATE AMERICAN METHODS OF RECEPTION.

By LIEUT. A. C. FULLER, R.E.

SITUATED as the author is in Bermuda, some opportunities arise of becoming acquainted with the present American ideas on the above subject.

First it may be mentioned that in the U.S.A. wireless stations may be erected and worked by anyone without let or hindrance. The direct result of this is that many of the young electrical students have installations of their own, and are thus early able to get some practical knowledge of the subject. Secondly there are many firms who make all kinds of wireless apparatus for retail sale—thus enabling the student to proceed from purely laboratory experiments up to practical working, and to obtain experience with all patterns of apparatus.

Ships' Aerials.—Vessels fitted by American companies usually carry a heavier aerial than that carried by British or Continental ships. The American aerial would generally consist of a 4 or 6-wire aerial in place of the usual 2. The wires of these aerials are joined in groups at the leading down end, and are all connected across at the other. In the case of a 6-wire aerial the connections for receiving are as shown in *Fig.* 1 of the *Plate.* The aerial is wrongly drawn for clearness but of course the six wires are all in one horizontal plane.

It will be seen that the group marked *a* is connected directly to the tuner—the group *b* is usually connected to the ground, but this earth connection can be broken by the switch S_2. In 4-wire aerials the group *b* is done away with. The group *c* is connected to a switch S_1 which allows the operator to put it to earth or to put it to the tuner in parallel with the *a* group.

The object of this arrangement appears to be to render the aerial elastic *i.e.* to give it a variable oscillation constant—thus allowing the operator to adapt his aerial more or less to the length of wave he wishes to receive—in fact to accomplish the first rough tuning on the aerial itself, thus diminishing the tuning inductance coils required.

Atmospheric effects may also be mitigated to a certain degree by a skilful manipulation of such an aerial.

Tuning.—All detecting seems to be done inductively, hence there are two entirely different circuits to tune, (*a*) the primary which

Digitized by Google

receives the oscillations and passes them to earth—(*b*) the secondary which contains the detecting apparatus and operates by induction from the primary.

These circuits must of course be tuned to each other, and both to the distant station. The primary circuit is tuned as a rule by the addition of inductance to that of the aerial, this added inductance being wound to form the primary of the transformer tuner. This inductance is varied either by a contact which can slide on a bared portion of each turn, or by dividing the primary into a large number of parts each one being brought out onto a contact stud over which a contact arm revolves as in an ordinary rheostat.

This primary coil is wound on a hollow cylinder of ebonite, or in any case is so arranged that the secondary can be fitted within it. When a hollow cylinder is employed, the secondary is wound on another cylinder of slightly smaller diameter which fits inside the former. By sliding this secondary coil in or out of the primary, close or loose inductive coupling is obtained.

Photo No. 1 shows a method of placing the primary inside a box in and out of which the secondary is geared to slide.

The secondary coil is usually divided only into a few (up to eight) subdivisions. The fine tuning is brought about by arranging a variable condenser across the portion of the secondary in use. *Fig.* 2 (*Plate*) shows the arrangement.

Detectors.—Of the numerous patent detectors in use the crystal type seems to be most often met with. It is the usual practice to have two detectors in circuit with a change-over switch. One of the detectors is not very sensitive, and is used at close range during heavy work where a sensitive detector would be so affected as to render all signals one unintelligible hum. The second is of the most sensitive type available, and is used for distances above 200 or 300 miles or when the received signals become weak.

The crystal detectors that the author has tried have all been very excellent when properly adjusted. The fact, however, that they are comparatively insensitive unless so adjusted, is a slight drawback to the type.

Perhaps the simplest detector in use is the silicon—consisting of a brass point in contact with a piece of silicon. When the correct pressure is obtained this detector, which requires no cell and in fact will not operate with one, is remarkably sensitive. The author, at Bermuda, has read the Cape Cod Station some 800 miles away with this simple form.

Telephones.—The telephones, which are universally used for reception, are all wound to very high resistances up to 2,000, 3,000, or 4,000 ohms. These telephones have smaller diaphragms than those used for telephony and respond to infinitesimal currents.

Through the courtesy of the "Wireless Specialty Apparatus Co."

Digitized by Google

of New York, the author has been supplied for experimental and testing purposes with a receiving set of the latest pattern. The set is an exact duplicate of those recently supplied for the Japanese Government by the firm, and represents the latest ideas on the subject. The photograph and diagram of connections will explain the arrangements. The set consists of an inductance coil which will tune up to 4,000 metres—a loose coupled tuner, variable condenser and detector set. This detector set contains a fixed condenser—test buzzer, potentiometer, and two detectors one called "Perikon" the other and less sensitive "Pyron."

The detectors themselves are enclosed in a copper box which will swing back to allow of adjustment. The perikon consists of two cups one movable and one fixed. The movable and smaller one contains one small mass of mineral (Chalcopyrites—$Cu_2SFe_2S_3$—) the fixed several such masses (Zincite—ZnO).

Adjustment is made by moving the small cup containing the single fragment, so that it makes contact with different portions of the mineral in the larger cup until the best response to a distant station or the test buzzer is obtained. The potentiometer dial switch is then varied to the position of best response. The pyron detector consists of a brass point which bears lightly on a metallic mass which has the appearance of fuzed silicon. The cup containing this metal is moved under the brass point till a sensitive position is found, the pressure of the brass point is then adjusted by a large ebonite screw provided for the purpose till the best result is obtained.

Some results obtained by the author may prove of interest:—The receiving aerial was made up as follows. From a 4′ wooden rod suspended some 80′ high—a pair of wires (copper No. 14) lead down making an angle of about 40° with the ground. These wires terminated in 1′ ebonite rods some 20′ from the ground. From a point near the top of this pair, two nearly vertical wires were led. These were joined at their base and brought into the station (see photograph).

The earth connection was the lightning conductor of the mast, consisting of a wire rope about 1″ in diameter leading through about ¼ mile of rock to the sea.

The following list of stations able to be read at Bermuda gives some idea of the value of the set under the not very favourable conditions of its trial.

Jamaica (Lepel System).—About 1,100 miles distant nominal range 300 k.m. Signals weak.

Key West, U.S.A. (U.S.A. Naval Station).—Signals very strong.

Manhattan Beach.

S.S. "Bermudian."—Up to 600 miles—power 2 k.w.

Brant Rock.—Signals very strong indeed.

Cape Cod.—Signals variable.

Digitized by Google

Several other stations on the East Coast of America with various wave lengths were heard.

Vessels, up to a dozen or so, on slightly different wave lengths could frequently be heard simultaneously—pointing to the fact that the receiver was capable of reading 1 to 2-k.w. sets at an average distance of about 500 miles.

On continued experiments it was found that the perikon detector loses its sensitivity after some months. The cups however can be replaced by spares in a few seconds.

The pyron detector appears to remain sensitive and to need no attention for very prolonged periods.

Digitized by Google

THE AUSTRIAN OPERATIONS IN NORTH ITALY IN 1848.

By CAPT. F. D. IRVINE, R.E.

THE Austrian operations in N. Italy in 1848, appear to be very little known, yet the lessons which may be drawn from a study of them are of rather exceptional interest.

In the first place, while presenting a fine example of the value of the offensive spirit in war, they also show how the mere possession of the initiative is of little value if proper use is not made of it. Then they illustrate the use of fortresses in a theatre of war, and also show how their presence may divert the enemy's attention from his true objective. Lastly, these operations contain a remarkable example of a flank march, and of a great pursuit.

Throughout them, we see the advantages conferred by thorough peace training and intuitive co-operation on the Austrian side, as opposed to the lack of cohesion among the heterogeneous collection of units which composed the Army of Allies. Moreover, the terrain is interesting as being the scene of Napoleon's triumphs in 1796 and 1797, as well as subsequently that of Custozza in 1866; in fact the Archduke Albrecht—famous in the latter campaign—served in these operations and doubtless profited by them.

This short essay is based on two German accounts and cannot pretend to be a full history of the campaign, the accounts of the actual battles of which are very interesting reading.

Before going into the actual operations, it is desirable to say something about the leaders on both sides, as well as the armament of the times. The Austrian Commander-in-Chief in North Italy was Field Marshal Count Von Radetzky, a veteran of over 80. He had fought all through the 1796 and 1797 campaigns, and also at Marengo against Napoleon, and had learnt his lessons from these brilliant operations. He was famous for his energy and activity, and these operations, as well as those of 1849, which are dealt with in Hamley, are pervaded with the offensive spirit. He had taken over command of Lombardy and Venetia in 1831, and during these 18 years had an opportunity, such as falls to the lot of few commanders,

Digitized by Google

of putting into practice his own theories as to the training of the troops. He was assisted for some time by Count Ritter Von Hess, Chief of the Staff, a very able man, highly esteemed in the service.

A systematic training of the troops was carried out by companies, battalions, regiments, and brigades, and culminated in corps practice camps lasting 10 days. This was quite new at that time although the field service regulations of the Austrians recommended such practice camps. The regulations were, however, more honoured in the breach than in the observance. The Austrian infantry had lately had the new percussion cap issued to them, and great things were expected of it. The effective range was still some 300 paces, however, and all fire was delivered in a standing position.

The Allies consisted of the Kingdom of Sardinia, with the States of Tuscany, Parma, Modena and Naples. The Pope also threw in his influence, mainly with a view of revivifying his moribund power.

Of this numerous collection the paramount partners were Sardinia and the Pope, each was jealous of the other and the Papal troops as a matter of fact did not actually join the Allied Army, but operated separately in Venetia. There were no leaders of renown among the Allies, and the King of Sardinia took the lead by virtue of the superior number of his troops. All decisions were arrived at by Councils of War, the weakness of which has often been demonstrated. Both the armament and the training of the Allies were poor. Their *morale* was fairly good as they were fighting the cause of their blood relations.

The operations divide themselves into three phases.

(*a*). The revolt of N. Italy, and temporary repulse of the Austrians.

(*b*). The rapid strokes by which the Austrian C.-in-C. freed himself.

(*c*). The decisive battle and pursuit.

(*a*). THE REVOLT IN N. ITALY.

In March, 1848, an insurrection broke out in Milan. This was the signal for a general rising against the Austrians throughout Lombardy and Venetia.

The I. and II. Austrian Corps were scattered in garrisons and as frontier guards on the Po and Ticino. The campaign opened disastrously as Venice fell, and 20,000 Austrian troops—of Italian extraction—deserted.

Radetzky was compelled to abandon Milan, and he concentrated

Digitized by Google

by the end of March the major part of the two corps, 30,000 men, at Verona, with a body of 5,000 at Pastrengo and garrisons in the quadrilateral fortresses, Verona, Peschiera, Mantua and Legnago. Milan to Verona is a distance of 110 miles, and this concentration was no small feat of arms, and impossible without the co-operation of all the subordinate Austrian commanders.

Situated at Verona, Radetzky was at the point where reinforcements could first reach him down the Adige Valley. Moreover he covered his line of retreat northwards, and held out a hand to the remains of his II. Corps—15,000 men—which had been collected on the Isonzo. The Isonzo is at the head of the Adriatic. Owing to the supineness of the Papal General at Vicenza, this corps ultimately evaded him and reached Verona.

The Allies, 70,000 in number, led by the King of Sardinia, followed the Austrians in a very leisurely manner. The first action was at Goito where the passage of the Mincio was forced on April 10th. The Allies then halted for three weeks, being content with investing Peschiera and masking Mantua.

On the 28th to 30th April, the King advanced to Pastrengo and drove the Austrians across the Adige. By this movement, he cut them off from their direct line of retreat, and, had he continued his attack with vigour, a decisive action would have been forced, or the Austrians must have retired towards Vicenza, held by the Papal troops. Venetia might have been cleared, a considerable success would probably have been gained by their enormously superior forces, and internal dissensions might have prevented Austria from ever undertaking the reconquest of N. Italy. The Allies could afford to risk a battle while the Austrians could not afford to take any risks.

However, the opportunity was let slip, and on the 6th May the Allies made a frontal attack on Verona from the W. with 40,000 men in three columns. Owing to mistakes the columns assaulted at different times, two were driven back, and so the whole army retired to the hills on the line Pastrengo-Villafranca.

The King of Sardinia's assault on the south wing had been successful, but he was disappointed that Verona gave no signs of rising in co-operation as he had expected, and in place of pushing his own success he joined in the general retirement.

There is little doubt that this was the crisis of the campaign and that the Allies had in their grasp an opportunity of success which never recurred. Their superior numbers gave them the initiative, but, as they did not know how to use it, it passed from their grasp.

On May 25th, the corps from Isonzo reached Verona, and Radetzky felt himself strong enough to take the offensive. We thus pass to the second phase.

Digitized by Google

(*b*). RADETZKY'S STROKES.

The position on both sides was now as follows.

The Austrian garrisons still held the quadrilateral fortresses, and there was a field army of 45,000 at Verona. A division at Rivoli covered the passes into the Tyrol.

The Allies still held Venice and Vicenza, the latter with 20,000 Papal troops under General Durando. The Tuscan division 10,000, strong, masked Mantua, while 55,000 Sardinians occupied an extremely strong position in the hills on the line Villafranca-Pastrengo, covering the siege of Peschiera.

Radetzky was far too weak to attack the allied position in front, but as he was anxious to relieve Peschiera and effect a diversion, he determined on a bold stroke. This was to surprise the enemy's detachment near Mantua, and then to wheel northwards and take the allied position in flank. This necessitated a flank march, a hazardous operation, and left Verona exposed.

However, he marched at darkness on May 27th with great secrecy in three parallel columns, the centre *viâ* Isola della Scala, while the right passed within 5 miles of Villafranca, the enemy's right. Meanwhile, to distract the enemy's attention, a feint was made from Rivoli. The operation was a complete success.

Mantua was reached on the afternoon of the 28th, a distance of 25 miles, and on the next day Radetzky completely routed the Tuscan troops at Curtatone and Montanara and drove them southwards over the Po. On the 30th, he wheeled northwards and continued his advance west of the Mincio to Goito.

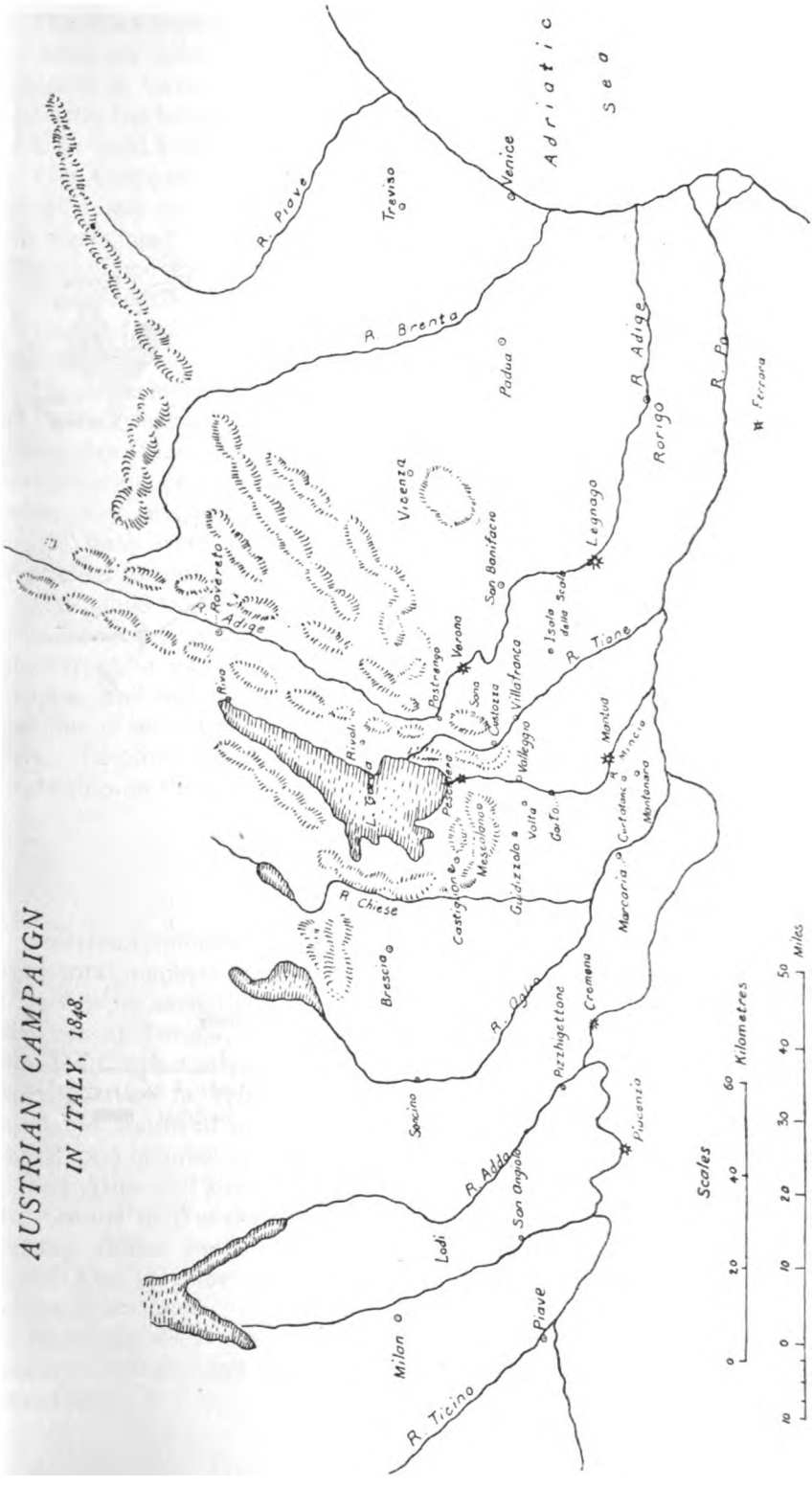
The Allies only heard of this march on its completion. Troops were hurried south, and on the evening of the 30th, 40,000 men were collected at Goito. The Austrian march came to a standstill, and the news that Peschiera had capitulated now arrived. Radetzky therefore withdrew across the Mincio N.E. of Mantua.

Before passing on, it is impossible to help noticing the resemblance between this operation and Napoleon's flank march to Arcola in 1796. Did the latter inspire Radetzky ? Both marches were carried out in a similar manner and each had primarily the same effect, *i.e.* that the army was placed on the enemy's flank and rear. This will be referred to later.

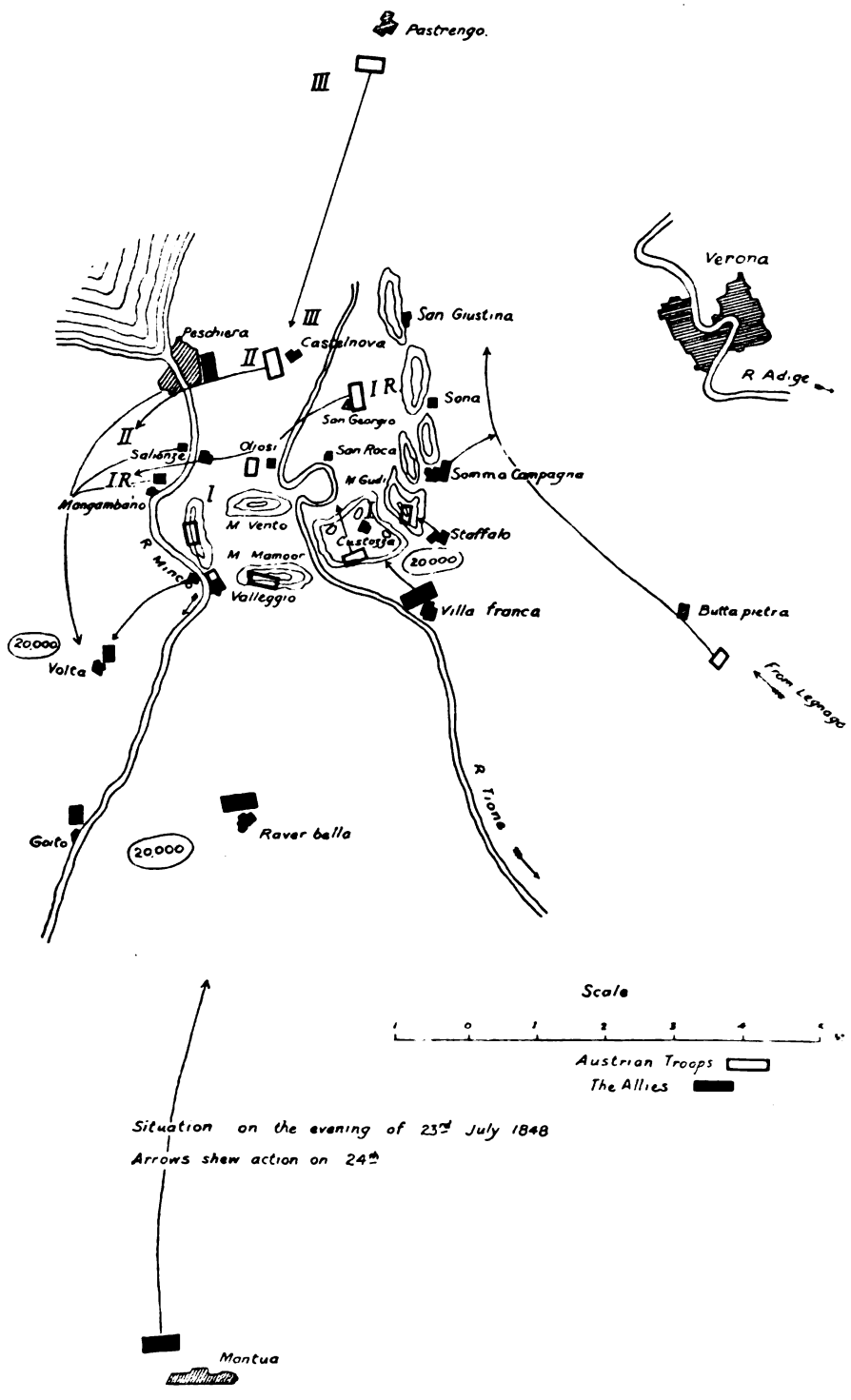
To resume, heavy rain now fell for three days and operations were rendered impossible. On June 3rd, the Allies advanced in force to attack the Austrians, but the latter had already left.

Radetzky had planned another bold stroke. Leaving a rear guard with orders to retire on Verona, he marched *viâ* Legnago to Vicenza to deal with the Papal troops there. At the same time he drew a column from Verona in order to keep his force up to the necessary strength.

Digitized by Google



Digitized by Google



Digitized by Google

The Allies were completely deceived and only learnt the true state of affairs on June 10th, the very day when General Durando was attacked at Vicenza. The latter learnt of Radetzky's approach on June 7th, but he underestimated his opponent's strength and thought that he could hold his own.

The Austrians reached Vicenza on June 9th, having marched 60 miles, and on the 10th, General Durando was forced to capitulate. He was compelled to withdraw his army south of the Po out of the theatre of operations.

Thus Radetzky put into practice the lessons taught by Napoleon in 1796 and 1797. He fell on the enemy's detachments and defeated them in detail.

The Allies meanwhile had taken Rivoli, and, on receipt of the news of Radetzky's march to Vicenza, they intended to advance on Verona. Three days were, however, wasted in a festival to celebrate the incorporation of Lombardy into the Kingdom of Sardinia, so that when they advanced on June 13th, they were met by the Austrian troops fresh from their victory in Venetia, and were once more compelled to retire to their former positions.

Thus while the Allies had done little but countermarch among the hills, Radetzky, by his two bold strokes, had weakened the enemy to the extent of 25,000 men, had freed Venetia, a province fertile in supplies, and had assured to himself both manœuvring room and a safe line of retreat to Austria, should events there render this necessary. To crown all, there remains the moral effect of his successful leadership on the troops of both sides.

(*c*). The Final Stage.

Austrian reinforcements reached Verona in the middle of July, and their total numbers are given in the appendix.

It will be seen that there were three corps, Nos. I., II., and one Reserve at Verona, with a brigade of cavalry and corps artillery. No. IV. Corps was at Legnago. No. III. in S. Tyrol. There was a large garrison in Mantua and garrisons in Venetia. The field force available consisted of 50 battalions, 40 squadrons, and 30 batteries, say 46,000 infantry, 4,000 cavalry, and 180 guns.

The Allies still stood on the line Villafranca-Pastrengo-Rivoli, and the Council of War decided to make another attempt to take Mantua. Strong forces were therefore pushed southwards, extending the allied line to some 30 miles in length, their total numbers being about 60,000 men.

Radetzky decided to pierce this line about Sona, to hold off the enemy's left and roll their centre and right back on to the Po and Mantua.

Digitized by Google

The advance was ordered for July 22nd, but unfortunately a violent storm delayed the main body at Verona. The III. Corps, which advanced from Roveredo to attack the enemy's left wing at Rivoli, became so heavily engaged that the allied commander was alarmed and withdrew his troops towards Peschiera.

The Austrian main attack took place on 23rd on Sona, San Giustina and Castelnovo, and found the Allies in the following positions :—

General de Sonnaz with 10,000 men retiring from Rivoli and Pastrengo on Peschiera ; the King of Sardinia with 20,000 men at Sona, Villafranca and Valeggio ; while 30,000 men, the bulk of the force, lay near Mantua.

The surprise was complete in spite of the withdrawal of the enemy's left wing, and on the evening of the 23rd, the Austrians held Castelnovo, Oliosi, and the heights of Monte Mamaor, Custozza and Staffalo. No. I. Reserve Corps was at San Georgio and No. III. Corps coming up from Rivoli. A brigade was also on the march from Legnago towards Sommacampagna.

On the 24th, General de Sonnaz, who was left without instructions and was afraid of his isolated position, withdrew across the Mincio southwards to Volta, leaving however a garrison in Peschiera. By this move he abandoned Valeggio and the passages of the Mincio which were at once seized by the Austrians. The situation was not clear to the Austrian commander, who thought that this withdrawal betokened a transfer of the main strength of the Allies to the W. bank of the Mincio. He therefore transferred the bulk of his troops also across the river.

The King, however, had collected 20,000 men at Villafranca and so, being unaware of de Sonnaz's retirement and still hoping for co-operation from him, he made a counter-attack on the heights of Custozza and Staffalo late on the evening of the 24th. The weak Austrian forces were driven from their positions, but night put an end to operations. This counter-attack also struck the brigade on the march from Legnago in flank, and it was driven past Sommacampagna with considerable loss. The evening therefore cleared up the situation. The bulk of the Austrians now lay on the west, while the bulk of the allied troops still lay on the east of the Mincio, and the position won by the King of Sardinia menaced the Austrian left wing and rear.

Radetzky issued his orders on the night of the 24/25th ; these were for No. I. Corps to hold the passages of the Mincio at Salionze and Valeggio, and also the line from Valeggio to the Tione *viâ* Monte Mamaor. No. II. Corps was to attack Monte Godi and Sommacampagna assisted by a brigade from Verona. No. I. Reserve Corps with the Legnago brigade were held in reserve at San Roco. No. III. Corps from Rivoli was to mask Peschiera.

Digitized by Google

The Allies were divided by the Mincio, the crossing at Goito being the only one of which they had possession ; 20,000 men lay at Volta, 20,000 were on the heights north and west of Villafranca while 20,000 still lay south of that place and at Goito.

The King's plan for the 25th was to make a concentric attack on the Austrians, to retake Valeggio and to unite his wings.

The allied orders however miscarried ; for, while the troops under General Bava between Villafranca and Goito reached Valeggio about 8 a.m., the King's troops were not ready to move from Custozza until 11 a.m., while General de Sonnaz at Volta only received the orders at noon.

In any case Radetsky had anticipated the enemy, for his dispositions were made in the night and the allied troops were attacked before their orders could be put into effect.

General Bava did indeed attack Valeggio and Monte Mamaor, but, being unsupported, was unsuccessful.

The Austrian attack on Sommacampagna was well carried out and quite in accordance with modern ideas. A turning force was despatched in the night to the north, the right flank of the Sardinian position, while the brigade from Verona arrived on the east of Sommacampagna at dawn. The Allies were driven from their position and retired in confusion about 6 p.m. through Villafranca to Goito.

Meanwhile the Commandant of Mantua, on his own initiative, had engaged the enemy S. of Goito and thus participated in the victory.

The Austrians pushed on in parallel columns on July 26th on Castiglione and Guidizzolo. An attack on Volta, which lasted all night until the 27th, broke down the last resistance of the Allies.

The King of Sardinia now proposed an armistice, and during the negotiations succeeded in withdrawing his troops across the Oglio at Marcaria. Marching by Cremona and Pizzhigettone, he reached Milan on the 2nd August. The Austrians marched in parallel columns, and, on the 4th August, drove the remains of the Allied Army back into Milan. Radetzky magnanimously decided not to storm the town, and as the result of a parley the King of Sardinia withdrew his troops over the Ticino.

Thus in five months the Austrians had recovered all their lost ground, and had beaten the Allies at every point.

This concludes the operations; it remains briefly to point the lessons of this short campaign.

In the first place, we see that Radetzky seized the initiative as soon as he possibly could, and by his bold offensive strokes freed his army from its precarious position.

Then, on the arrival of reinforcements, he wasted no time in falling

Digitized by Google

on the weak spot in the enemy's lines, and in ending the campaign in one decisive battle. Contrasted with the operations of 1796–97, the Allies made the same errors as the Austrians, and though Napoleon would doubtless have been more active and inflicted more severe punishment on his enemy had he been in the position of Radetzky, still the latter shows that he had profited by the lessons of Napoleon's campaigns. In fact, we see the effect of Napoleonic principles all through this campaign of 1848.

We may also note the skilful way in which Radetzky turned his possession of the quadrilateral fortresses to good account, using them as pivots for the operation of his field army. On every possible occasion their garrisons were employed in co-operation with his own movements to distract the enemy's attention, to deceive him, and to supplement his own strength.

On the other hand, the fortresses served as baits to the Allies who were diverted from their true objective, viz. :—the defeat of the Austrian field army.

Napoleon once said that the possession of the plateau between the Mincio and Adige meant the possession of Italy. The Allies were led away by this dictum to attach too much importance to their position without reference to other causes. We have seen a similar faith in positions rudely dispelled in Manchuria.

We have already noted the similarity between Radetzky's flank march to Mantua and that of Napoleon to Arcola. Both were brought to a standstill, and for the same reason, viz. :—that the enemy was not at the same time held in front.

Napoleon's genius and the loyal co-operation of his subordinate generals achieved the greater result, Radetzky on the other hand, having Mantua at his back, took a lesser risk.

Finally we come to the pursuit and, in passing, we note the use of the ruse by which the Sardinians escaped destruction. From the Mincio to Milan is 90 miles, and the enemy were given no respite. Radetzky moving on parallel lines to the enemy prevented any rally. This is comparable to Marlborough's pursuit after Ramillies by which he regained the whole of the Low Countries.

No doubt modern inventions have rendered such operations somewhat obsolete in a way. For instance, in the final battle, touch was completely lost for three days between the main army of the Allies and their left wing. This could hardly happen nowadays; penetration will be far less frequent, as also flank marches because they entail far greater risks now than formerly. Still the lesson to be learnt is not a blind imitation of the operations so much as the prompt seizure of the opportunity offered.

It is curious to note how very badly served the Allies were as regards intelligence, considering that the inhabitants were friendly. The explanation may perhaps be found in the very difficult nature

Digitized by Google

of the country south of Villafranca, filled as it is with vineyards and intersected with water channels. We must also remember that the Austrians have always made a speciality of secrecy.

The fog of war is well exemplified on the evening of the 24th July, and is similar to that which existed on the eve of Sadowa.

Throughout the whole operations, we may contrast the advantages of a uniform training in the Austrian Army, with the lack of uniformity in ideas and lack of co-operation on the part of the Allies, who suffered from divided councils.

To sum up, Radetzky's successes were due in the first place to the thorough peace training of his troops, and, in the second, the more important, to his offensive spirit. Although not in superior force, he seized the initiative, and by being stronger than the enemy at the decisive point, ensured victory.

AUSTRIAN STATE, 15TH JULY, 1848.

Verona.

I. Army Corps.—F.M. Count Von Wratislaw.

Division.—Schwarzenburg.

Brigade Strassoldo... ... ... { 4 Battns. / 2 Squadrons. / 6 Guns. } Each.
,, Clam ... ... { 4 Battns. / 2 Squadrons. / 6 Guns. } Each.

Division.—Von Rath.

Brigade Von Supplikatz ... ... { 4 Battns. / 2 Squadrons. / 6 Guns. } Each.
,, Wohlgemuth ... ... { 4 Battns. / 2 Squadrons. / 6 Guns. } Each.

Corps Artillery Reserve ... ... 12 Guns.

Total { 16 Battns. ... ... / 8 Squadrons ... ... / 36 Guns ... ... } 15,000 Infantry and Sabres.

II. Army Corps.—F.M. Count D'Aspre.

Division.—Wimpffen.

Brigade Lichtenstein ... ... } Strengths as above.
,, Kerpan ... ... }

Division.—Schaafgottsche.

Brigade Schwarzenburg ... ... } Strengths as above.
,, Gyulay ... ... }

Corps Artillery Reserve ... ... 18 Guns.

Total strength { 16 Battns. ... / 8 Squadrons ... / 42 Guns ... ... } 15,000 Infantry and Sabres.

I. Reserve Corps.—F.M. Count Von Wocher.

3 Brigades Infantry 11 Battns. and 18 Guns.
1 Brigade Cavalry 20 Squadrons and 18 Guns.
Corps Artillery 40 Guns.

Total Strength { 11 Battns. ... ... / 20 Squadrons ... ... / 76 Guns ... ... } 12,000 Infantry and Sabres.

Total at Verona ... 42,000 Infantry and Sabres, and 154 Guns.

Digitized by Google

Austrian State, 15th July, 1848 (continued).

Roveredo.

III. Army Corps.—F.M. Count Von Thurn.

7 Battns.		
3 Squadrons		6,000 Infantry and Sabres.
18 Guns		

Legnago.

IV. Army Corps.—Von Culoz.

3 Brigades	10 Battns.		
	6 Squadrons ...		10,000 Infantry and Sabres.
	35 Guns		

The above provided the field force after deductions for holding Verona and Legnago.

Venetia.

(Venice, Vicenza, Padua, Treviso, etc.).

II. Reserve Corps.—F.M. Count Von Wehlen.

17 Battns.		
6 Squadrons		16,000 Infantry and Sabres.
43 Guns		

Garrison Troops.

Legnago	1 Battn.		
Ferrara	1 ,,		
Mantua	10 Battns.		
	3 Squadrons		10,000 Infantry and Sabres.
	6 Guns		

Digitized by Google

A SPECIAL VITRIOL CHIMNEY AT THE CORDITE FACTORY, ARUVANKAD.

By MAJOR F. A. WILSON, R.E.

THE following is a short account of the history and design of a special vitriol chimney at the Cordite Factory in the Nilgiri Hills, Southern India. When the works were originally constructed, a chimney 90′ high and 5′ internal diameter was built of hard stock bricks, specially moulded to suit the radius of shaft, and set in mortar. The foundations were of blue stone coursed rubble stepped down to a 21′ square lime concrete platform resting on a good gravel foundation. This chimney served the nitric acid house and the vitriol chambers, the flue from the former being led into the shaft at the base, and from the latter by a lead pipe 18″ in diameter through a 20′ hole, 26′ above the base.

Near the end of 1904 the Sub-Divisional Officer reported that, owing to the effects of the condensed acid fumes from the vitriol chambers, the brickwork was being rapidly eaten away at the spot where the fume pipe entered the shaft. To enter the shaft was found impossible owing to falling fragments of acid-impregnated particles of brick, but probing with a knife showed that the acid had turned the masonry for a depth of 2″ or 3″ into a substance resembling wet salt. As the chimney showed signs of bulging, steel bands were ordered for strengthening it, but these did not arrive in time to save it.

It was impossible to stop using the chimney without hanging up the factory, and as matters got worse it was realized that a new chimney would have to be built and in the least possible time, which fact, necessitating the use of the existing foundations coupled with the condition that the internal diameter must be 5′, precluded any material alteration in design.

The reserve stock of sulphuric acid was practically completed when on the 23rd December, 1904, as the cracks had increased to an alarming extent, the chimney was dismantled from the top to below the fume opening, the scaffolding having been erected in anticipation.

As South Indian blue bricks had been found incapable of resisting acids, an objection applicable also to Portland cement plaster lining, the Superintendent, Cordite Factory, had suggested rebuilding in Staffordshire blue bricks, but apart from the prohibitive cost, to have obtained special moulded bricks from England was out of the question where time was so important. Messrs. Burn & Co.'s blue-glazed bricks were then tested and found satisfactory, moulds were sent them

Digitized by Google

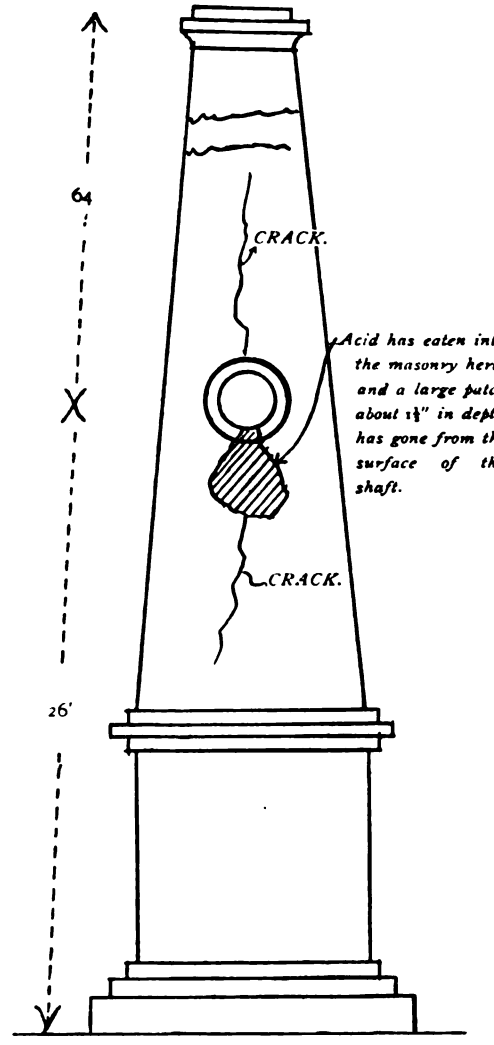

64'
CRACK.
Acid has eaten into the masonry here, and a large patch about 1¼" in depth has gone from the surface of the shaft.
CRACK.
26'

FIG. 1.

and, working night and day, they dispatched them by the truck load from Calcutta as ready. The rebuilding was started on the 22nd of February and completed on the 20th April, 1905, and the chimney immediately taken into use. The new chimney consisted of a 9" lining throughout of the above bricks, set in mortar consisting of 1 P.C. to 1 finely crushed blue brick, local sand being unsuitable, encircled and supported, with the exception of the top 10', with special mould stock bricks set in P.C. mortar ; a small oven was also built and connected by a flue to the chimney, its object being firstly, to improve the draught, and secondly, to increase the temperature in the chimney, thereby preventing the condensation of the fumes on the internal surface ; at

Digitized by Google

the same time the Ordnance Department altered the vitriol flue so that it entered at the base of the chimney.

In June, 1905, the Sub-Divisional Officer reported that four vertical cracks had appeared extending upwards from the *bottom* and that they were rapidly opening. The interior of the chimney was found to be heavily coated with acid paste, and the auxiliary furnace, whose use had been neglected, was started. On the 25th July further slight cracks appeared and examination showed that the use of the auxiliary furnace had cleared away the acid paste from the surface of the blue bricks. The blue bricks were apparently unharmed and the joints were quite tight but seemed to be finer than when made, which would appear to indicate that the blue bricks had swollen from acid absorption.

The steel bands previously ordered had been wired for and these (16 in number) were now fixed.

A year later in June, 1906, further cracks appeared and an examination on the 2nd of July after the small furnace had again been put into use showed 6" of acid deposit on the floor and ½" of moist acid paste on the blue brick lining, and, on removal of this latter, the blue bricks were found to be to all appearance unaffected but the P.C. joints were corroded to a depth of ¼" to ½"; there were however no signs of bulging.

It was decided to do nothing and this action was justified as the chimney remains to-day as it was then.

The cause of the cracks was evidently the swelling of the lining under the action of the acid, but whether the blue bricks or joints swelled, or both combined, is a moot question; personally I am in favour of the latter hypothesis, as even Stafford blue bricks have been known to act so. Had it not been necessary to take the chimney into use while the brickwork was quite green, the cracks would no doubt have been much less serious and perhaps little noticeable.

As on this chimney depended the working of the factory, it became evident that some standby must be provided in case of its failure, and various ideas were mooted such as a second chimney with an inner shell of glazed brick separated by an air space from the chimney shaft proper. The fact that acids were conveyed about the acid branch in glazed earthenware pipes eventually suggested the solution, which was to build an earthenware column to take the fumes from the vitriol chamber, and to use the existing chimney for the nitric acid house whence no acid fumes emanated.

The design, the details of which are shown in the plate, consists of a trestle column enclosing and supporting another of 20" diameter glazed stoneware piping. The bottom 40′ of the column is of mild steel, but the top 12′ of teak, as wood is a good acid resister, and this portion would be in the vicinity of the acid fumes emanating from the chimney. The mild steel column is provided

Digitized by Google

at every 10′ with a platform or cross-bracing, at the centre of which is a collar for supporting one of the pipes from under the flange, so that the pipes being 2′ in length every fifth is supported except in the top section. At the suggestion of the Manager an oven was erected, connected with a base of blue Feroke bricks, to increase the draught if necessary, and from this base a lead fume was carried by the Ordnance Department to the vitriol chambers on wooden trestles erected by the Military Works. This base gave considerable trouble as both the bricks and the joints absorbed acid and swelled to such an extent as to push the whole stoneware column up 3″. The oven was however found to be unnecessary, as the draught was ample, and it was demolished, the lead fume being carried up to and round the end of the first pipe and secured to the first platform by clips. The stoneware pipes were joined together by the Ordnance with a plastic cement used in acid work.

The steel work of the column may appear heavy, but the object was to obtain rigidity and so prevent the joints between the stoneware pipes being spoilt by the swaying of the column. This was also the object of the guys which, however, were never used, as a heavy wind occurring before they could be fixed proved the column stiff enough by itself. Had the column with guys been found insufficiently stiff, it was intended to stiffen each section of stoneware piping by lashing to its circumference vertical wooden battens. The draught is regulated by dampers fixed in the lead trunk, and a light wooden ladder is provided for workmen, to move from one platform to another.

The chimney excluding the lead work but including the unfixed guys and all else shown in the plate cost £272 and has, up to date, proved a great success.

Digitized by Google

GIBRALTAR UNDER MOOR, SPANIARD, AND BRITON.

By Col. E. R. Kenyon, R.E.

Under the Moors.

The most prominent building now standing in Gibraltar is also one of the most ancient, namely the great square tower of the Moorish Castle, commonly called the Tower of Homage, which carries back our thoughts to the earliest historical occupation of the Rock by man. It has been stated that "The Goths built two Churches in the neighbourhood of Calpe, and a chapel or Oratory on the mountain itself: these churches were, one at Julia Traducta* and another at a little village now called St. Roque. The Chapel on the mountain was about the centre of the middle hill."† The geological exploration of the caves on the Rock proves the presence of man upon it in very remote ages; and the astronomer Euctemon (430 B.C.) refers to its being ascended by man; but no other records remain (either historical or archæological) to prove any permanent occupation of it prior to that by the Moors, who took possession in 711 A.D. under Tarik, the able lieutenant of Mousa, the Saracen conqueror of Northern Africa, when the traitor Count Julian (the Spanish governor of Ceuta at that time) invited them to invade Spain and assisted them in overthrowing his sovereign King Roderick, the "Last of the Goths," and thus avenged the wrong done to his daughter. Montero surmises (p. 86) that there must previously have been fishermen's huts on the Rock and that Tarik housed his first detachments in them, but this seems to be pure conjecture.

Various derivations have been given of the name Gibraltar, but there can be no doubt that it is a corruption of Gebel Tarik,—the Hill of Tarik,—thus commemorating the Moorish conquest. Ibn Batutah‡ quotes Ibn Djozay as saying "The mountain took the name of this warrior and was called the mountain of Thârik and also the Mountain of the Conquest." Since 711 A.D. Gibraltar has been subjected to numerous sieges, blockades, or attacks, of which the following is a brief summary compiled from Montero's *Historia de Gibraltar*, from which it will be seen that it was unmolested for 588 years after its seizure by Tarik.

* Now Tarifa.
† Dodd.
‡ Vol. IV., p. 355.

Digitized by Google

It is usual to speak of it as having undergone 14 sieges, but it will be seen that the 7th, 8th and 11th were really attempts to carry it by a *coup de main* of which two succeeded and one failed. The 2nd "Siege" was only a brief investment; and the 5th and 10th were blockades. The successful raid by Barbarossa's pirates in 1540 was another *coup de main* but is not reckoned among the 14 "Sieges" since it was all over in four hours.

No. of Siege or Attack.	Date. A.D.	Nature of Attack.	Result.
1	1309	Alonso Perez De Guzman occupies the mountain unopposed, besieges the Castle and Moorish Town, attacking from the side of the mountain, and blockades the place by land and sea.	Captured in September after 1 month's siege. The town then consisted of the two wards of Villa Vieja and La Turba which are shown on the map of 1627 in Bell's translation of Ayala's history.
2	1316	Invested by Moors.	Relieved by the Infante Don Pedro.
3	1333	Besieged by Moors who occupy the mountain and arsenal unopposed, and, later, capture the town and press their attack on the Castle.	Capitulates on June 17 after 4½ months' siege. The arsenal was approximately on site of Casemate Barracks.
4	1333	Besieged by King Alfonso XI., who advances by the crest of Sierra Carbonera and also lands troops on the Red Sands who are repulsed. A second party land there and effect a lodgment on the heights above the Castle, batter down the turrets and parapets of the Tower of Homage and attempt to undermine its walls.	Siege raised in September after 2½ months, on peace for 4 years being made between the King of Castile and those of Granada and Morocco.
5	1349	Siege commenced in August by Alfonso XI. but converted into blockade. Camp formed along the line now occupied by the Cemetery and the Gardens. Spanish squadrons cruise in the Straits.	Alfonso dies in camp of plague March, 1350, and the blockade is raised 8 months from commencement of siege.
6	1410	Revolt against King of Granada by inhabitants who invite the King of Morocco who occupies the town and besieges the Governor in the Castle.	The King of Morocco is surrounded in the town by a relieving force from Granada and captured.
7	1436	Attacked by Count of Niebla who lands at low water on the Red Sands, where the Saluting	Attack repulsed. The Count is drowned; and Don Juan with-

Digitized by Google

No. of Siege or Attack.	Date. A.D.	Nature of Attack.	Result.
		Battery was formerly, but the Moors had fortified this locality since 1333 so that the Spaniards cannot advance and are caught by the tide. The Count's son Don Juan simultaneously attacks the landport from the north, but withdraws to succour his father.	draws August 31st. The Count's body is kept by the Moors in the Tower of Homage (also called the Calahorra, or Granary).
8	1462	Alonso de Arcos, Alcaide of Tarifa, with 80 horse and 200 foot, guided by a renegade Moor (Ali el Curro) secretly occupies posts on the mountain in August, calls on Xerez and the neighbouring nobles to reinforce him, and attacks by land and sea.	Town is captured; Castle surrenders on second day. The place is occupied in the name of the first Duke of Medina Sidonia, (the Don Juan of the 7th Attack) on August 20th. The Duke inters his father's body in a chapel which he made in the "Calahorra."

This was the final capture of the place from the Moors. King Henry IV. of Castile claimed possession; and the Duke handed it over under protest. In December, 1462, the King granted to it all the territory of Algeciras, which town had been destroyed by Mahomed V. in his war against Henry II. of Castile.

9	1466	Besieged by the forces of the Duke of Medina Sidonia to whom the town is abandoned. The Castle holds out for 10 months. Its walls are then carried by assault, but the Royal governor holds out in the Tower of Homage for 5 more months.	Royalists surrender to the Duke's son, Don Henry, in June, 1467.

In 1478 Queen Isabella confirmed the possession of Gibraltar to the Duke of Medina Sidonia and gave him the title of Marquis of Gibraltar but in 1501 she compelled his heir, Don Henry, the second Duke, to transfer it to the Crown. The keys were handed to Garcilaso de la Vega as Royal Governor in January, 1502.

10	1507	The third Duke of Medina Sidonia (not second, as stated by Ayala) forms a land blockade.	Blockade raised after some months.
Not usually numbered among the "Sieges."	1540	Turkish pirates, sent by Barbarossa's deputy land in the bays of Almadrabilla (north-east of Europa Point) and Laudero (now called Little Bay), plunder the town and Franciscan Convent (the present Government House) and the Hermitage of Europa.	Turks re-embark at the Almadrabilla Bay after four hours on shore with plunder and 70 captives who are afterwards ransomed. The Turks lost 70 men, the Spaniards 20.

Digitized by Google

No. of Siege or Attack.	Date. A.D.	Nature of Attack.	Result.
		The Turkish squadron was subsequently met and destroyed by the Spaniards who liberated 800 Christians from the galleys and captured 400 Turks.	
11	1704	British fleet under Sir G. Rooke and Prince Henry of Hesse-Darmstadt anchors in the bay on August 1st,* and lands a force on the isthmus (not at Punta Mala as stated by Ayala). On August 4th a bombardment is followed by landings on the New and Old Moles and north of the former.	Capitulates on Aug. 6th; and the British take possession.
12	1704	Siege commenced by Spaniards and French September 5th.* An attempt to surprise the place by ascending a shepherd's path from Sandy Bay to the Silleta is made by 500 men under Colonel Figueroa but fails.	Siege raised after about 8 months.
13	1727	Siege commenced by Spaniards in February. A mine is commenced to blow up Queen Anne's battery but is not completed. Trenches are carried to the Inundation.	Hostilities suspended after 5 months on account of negotiations for peace, but blockade not entirely raised until June, 1728.
14	1779	Siege commenced by Spaniards and French in June. Trenches destroyed by sortie on night of November 26th, 1781. Great bombardment on 13th September, 1782, and disastrous repulse of the combined squadrons. A mine was commenced in the neighbourhood of that part of the Rock in which is St. George's Hall.	Hostilities suspended February 3rd, 1783, while peace is being negotiated which is signed at Versailles on 3rd September.

The principal existing buildings which preserve the memory of the Moorish occupation (A.D. 711—1462) are the Castle and the remnants of walls forming parts of the old fortifications; the remains of a bath in Bomb-House Lane; the Chapel of "Our Lady of Europa" opposite the main guardhouse at Europa; and a bath or tank, known as "The Nuns' Well" under the Brewery Barracks at Europa.

* These are the dates as given by Montero, but it must be remembered that Spain adopted the Gregorian calendar, or "new style," when it was promulgated by Pope Gregory XIII. in 1582, whereas England did not adopt it until 1751. Consequently up to 1700 there is a difference of 10 days between Spanish and English dates, and of 11 days from 1700 to 1751. Montero (p. 265) draws attention to the discrepancy but has not perceived its cause.

Digitized by Google

The Moorish Fortifications.

The Castle is stated by James to have been begun in 711 A.D. (*i.e.*, the year of the seizure of the Rock by Tarik) "but," he adds, "when finished is hard to say." Montero (p. 87) states that "the Castle has an Arabic inscription from which it appears that it was built or extended in the reign of Jezid ben Walid, 17th Caliph of Damascus, which thus fixes 744 A.D. as the date of the foundation of Gibraltar." Carter deduces the date of 740 or 741 A.D. from the same inscription, which was over the South Gate of the Castle (the large Moorish building now used for Army Ordnance Stores), but which no longer exists.

Dodd says that Tarik constructed lines "from east to west, from almost the top of the mountain to the small plain and had built a tower as an advanced post, a look-out, and a citadel."

Abdul-Mumen, who was the first Emir of the Almohades line (1130—1163 A.D.) and who crossed into Spain in 1146 to complete the overthrow of the Almoravids, already conquered in Morocco by himself and his predecessor Mohammed ben Abdullah,[o] is stated by Montero (p. 103) to have sent Abul Amren to destroy the Almoravids. This leader occupied Algeciras and Gibraltar and ordered the Architect Alhas Yahix of Malaga to extend the fortifications of Gibraltar. This order was put into force by his son Cid Abu Sa'id, Wali of Algeciras (1160), to which Gibraltar was at that time subject. Al Makkarí states (Vol. II., p. 314) that Abdul Mumen (1160 A.D.) "landed at Jebal-Tarik (Gibraltar) which from that day was Jebalu-l-fatah (the mountain of the entrance or victory), and ordered that a strong fortress should be erected on the top of it. He traced out the building with his own hands, and . . . appointed his son Abu Sa'id, then Governor of Granada, to superintend the building and report its progress to him."

We do not know exactly what these buildings of Abu Sa'id's were, but we do know that in the sieges of 1333 there was no wall along the coast to prevent men who had landed on the Red Sands (where the Alameda now is) from pushing inland; and that later records show that subsequent to 1333 such a wall which afterwards came to be called "The Line Wall," was built from the Arsenal—(on the site of the existing Casemate Barracks)—to the south end of the Rock. It is therefore probable that Abu Sa'id's works were confined to additions to the castle itself, and perhaps walls round that part of the city which was growing up in what was afterwards known as the ward of *Villa Vieja*, which is elsewhere described as the Lower and Middle Castles, and which undoubtedly became a walled suburb with its own gates.

The next stage in the development of the Castle seems to have been after the capture of the place by the Spaniards in 1309. The King

[o] *Encycl. Brit.*, Vol. I., p. 593, and Vol. XXII., p. 316.

Digitized by Google

(Ferdinand IV. of Castile, called "El Emplezado") came to take possession of it and "ordered the walls destroyed during the siege to be rebuilt and the Atarazana (arsenal) to be constructed for the defence of the galleys and vessels of the port with a very strong tower which might protect it against the attacks of the hostile squadrons."*

In 1350 we obtain a contemporary account of the Castle and other fortifications from Ibn Batoutah who was a native of Tangier and apparently one of the greatest travellers of the world. Between 1325 and 1349 he travelled in Egypt, Arabia, North Africa, Asia (from Asia Minor to China). He then visited Granada and, in 1351, the Soudan. Some copies of the history of his travels were discovered in Algeria after its conquest by the French; and the Arabic text with a French translation was published in 1853. In Vol. IV. (pp. 354—363) he describes his visit to Gibraltar, which was the first town in Spain he saw on his way to Granada. "I there saw the admirable works executed by our late master, Abou'l Hassan." He then gives a long quotation from Ibn Djazay, in the course of which the latter after saying that one can still see the remains of the wall built by Tarik and his companions which are called "the wall of the Arabs" adds that Gibraltar was again conquered by our master, Abou'l Hassan (A.D. 1333) who "built the immense tower in the top of the Castle; at first there was only one turret, which was ruined by the stones thrown by the engines (balistas), and our master caused the great tower which I have just mentioned to be built in its place. He also caused an arsenal or workshops, to be built at Gibraltar, which were lacking before his time. Lastly he raised the great wall which embraces the red hill, and which commences at the arsenal and goes as far as the tile-field (tuilerie). Later our master, Abou Inan, renewed the fortifications of Gibraltar. He constructed a wall as far as the end of the mountain: and that part which he added is the most remarkable and that of which the utility is the greatest."

"The immense tower" was, no doubt, the one which still exists and which is generally described as the "Tower of Homage." Montero, in his narrative of the sieges of 1309, 1333, and 1466, mentions the Tower of Homage or the Calahorra (*i.e.* Granary) as one of the chief parts of the castle, but, when describing the place as it existed in his time (1860), he says, (after speaking of the great tower at the north-east corner of the castle) "There remain in the castle no traces of the ancient and celebrated 'Tower of Homage.'" His whole description of the castle is however clearly an abridgment of that given by James who wrote nearly a century earlier (1771); and as James and also Carter speak of the existing one as the Tower of Homage, it would seem that Montero's statement must be a slip of the pen, and that he intended to say that no traces remained of the

* Montero, p. 118.

Digitized by Google

Giralda tower which Portillo speaks of as "a redoubt of very great strength and capable of containing sufficient numbers to defend the place, as was seen in the year 1333 when besieged by King Alfonso."* This tower is believed to have stood on the site of the present North Bastion.† Ayala quotes Portillo's description at length, which includes both the "tower called Calahorra" and the "redoubt called Giralda." and makes it quite clear that the former is that which still survives and is ordinarily spoken of as the "Tower of Homage," while the latter, standing at the north-west corner of the arsenal, was no doubt the "very strong tower" built under the orders of King Ferdinand IV.‡

After recapturing Gibraltar in 1333 Abou'l Hassan at once repaired its buildings and increased its fortifications "spending immense sums in building houses and magazines, as well as a principal mosque and erecting new walls, towers, and even a citadel. Before however these improvements were fully completed the Christians invested Gibraltar by sea and land"; but without success. "After this Abou'l Hassan again applied himself further to strengthen Gibraltar, by causing a thick wall to be built at the foot of the Rock, surrounding it on all sides, as the halo surrounds the crescent moon."§

The Arsenal was on the site of the Casemate Barracks; and the "wall which embraces the red hill" was probably the old Line Wall from thence to the "Red Sands" or Alameda. Nowhere else have I found any mention of the tile field, but it would seem probable that this must have been about the neighbourhood of Scud Hill where the great clay "fault" shows itself. If this is so we have apparently the following sequence of events in the construction of the Arab or Moorish works:—Tarik and his comrades built a wall which was known in 1350 as "the Arab wall" and which was probably that which runs parallel to Charles Vth's wall and still bears the name of "Moorish Wall." They or their immediate successors also built a castle, as is proved by the inscription above referred to assigning a date of about 740 to 744 A.D. to its completion. This castle was probably that which James calls "The Upper Castle" and which lies between the Tower of Homage and "Castle Row": *i.e.*, that which is at the present time known as "The Moorish Castle," omitting, however, the Tower of Homage itself. Then about 1160 Abu Sa'id built a strong turret or tower on the site where now stands the Tower of Homage. Next, in 1309 the Spaniards constructed an arsenal (on the site now occupied by the Casemate Barracks) and the Giralda tower on the North Bastion site which, being built in Moorish style

* Quoted by Ayala, p. 50.

† Dewing and the Ordnance Survey.

‡ General Skinner says "The North Bastion was originally a square Moorish tower which was enlarged in 1756." (No. 17).

§ Al Makkári, Vol. II., p. 355.

Digitized by Google

and before the final conquest by Spain was afterwards spoken of as a Moorish tower. In 1333 and subsequent years Abou'l Hassan enlarged, or strengthened, the arsenal, and built the Tower of Homage, Abu Sa'id's tower on that site having been ruined in the siege by the Moors in 1333. He also constructed the Line Wall from the Giralda to approximately the site of the New Mole, which was not itself constructed until the reign of Philip IV. (1621—1665). Before 1350 this wall was carried on by Abou Iman to the extreme south where its remains still exist above Europa Advance and at Deadman's Hole. The intermediate works between the Arsenal and the Upper Castle (called by James the "Middle Castle") may probably have been also constructed in 1309—1350, although it is possible that they were built by Abu Sa'id or his successors as an independent extension of the Upper Castle.*

James† says: "There is an old strong wall which comes down from the Middle Castle, reaching as far as the entrance into the Old Mole, part of which was taken down some time after the last siege,‡ but the lower part within the rampart is still standing which was part of the lower fort: this wall was given to the Navy to build against." This wall is now part of the Officers' Quarters, and it was here that the Navy had their cooperage, the memory of which is preserved by "Cooperage Lane." The Officers' Quarters are on the site of Navy storehouses; the stables, tank, etc., are where the cooper's house stood—which had vanished before the plan dated 1745 was made—the other cooperage buildings and the shot yards were on other parts of the Casemates site.

James also states (p. 403) that the Moorish galleys used to be launched through a large arch "now closed" north of Waterport. No sign of this arch now remains, the wall in this part having been completely reconstructed.

A note on a plan in Ayala's history describes the Castle as "with four towers, each with six cannons on the north and three on the west." The castle thus referred to is that which James calls the Upper Castle. The Clock, or "Stanley's Tower," at the south-west corner of the castle, is a modern structure on a Moorish foundation. The name of Stanley was given to it in 1845 when the clock was inaugurated, Lord Stanley (afterwards fourteenth Earl of Derby, the "Rupert of Debate,") being then Colonial Secretary in Sir Robert Peel's ministry.

* It is somewhat unfortunate that James coined the names of Upper, Middle, and Lower Castles, for it seems clear that the Castle proper was always that which he calls the "Upper," and that the two others formed the Arsenal, or Atarazana, which gradually grew into the walled quarter of Villa Vieja.

† P. 305, Vol. II.

‡ *i.e.*, The siege of 1727.

Digitized by Google

The Moorish Tower at Deadman's Hole.

Close to the lighthouse, a few yards west of the Trinity House quarters, stands an ancient turret of Moorish construction surmounting a spiral stair which gives access to the cliffs below. On the site now occupied by the lighthouse keeper's quarters there was formerly a little circular room with a dome-shaped brick roof with stone walls 4′ thick and about 7′ high to the springing of the roof. This room seems to have been completely covered over and buried out of sight when the light-house battery (now obsolete) was built; but in August, 1894,* when the quarters were being built it was brought to light and a leaden coffin was found under its floor, which gave rise to a report that the foundations of the ancient chapel of "Our Lady of Europa" had been found at this spot.† The chapel was in reality not there but opposite the guardhouse, where it is shown on the 1745 plan; the room was another Moorish structure; and the presence of the coffin is explained by the following extract from James (Vol. II., p. 326):—

"The tower at Europa Point has a room arched at the foundation in the Rom style, and winding stairs on outside at the top, easily to be traced; but before the building of Europa Line Wall the most part of the steps were entire. . . . The coved room is made use of for a guard of soldiers and vulgarly called the Deadman's Hole, on account that a gentleman was, at his particular desire, buried there under the floor of the above room. At a few yards' distance from the above tower, is a stone centinel box on the summit of a wave-worn rock, 34 yards and 2′ high from the surface of the sea, and falsely termed the southernmost point in Europe."

In process of time the name "Deadman's Hole" came to be misapplied to the little bay at the north-east side of the lighthouse into which the main sewer discharges, but it has been restored in the Ordnance Survey to its proper locality. The existing tower seems to have been the "coved room" described by James; while the room discovered in 1894 was the "stone centinel box," the gentleman having been buried under the latter instead of under the guard room as believed by James. Both structures were part of the Moorish defences, not Roman, as might be implied by James.

Moorish Bath.

In Bomb-House Lane there is a good specimen of a Moorish bath which was cleared of rubbish and opened up to view, so far as

* *Gibraltar Chronicle*, August 18th, 1894.

† These particulars were obtained in February, 1909, from a workman named Salvador Garcia who was one of those who discovered the building and the coffin.

Digitized by Google

practicable, in 1908. Unfortunately it cannot be completely detached from the adjoining official quarters without considerable expense, one of its chambers being utilized for an officer's stables, and other parts being in such positions that they cannot be thoroughly explored without serious alterations to the quarters themselves. However the general plan of the building may now be seen, together with the floors of Moorish tapia* and portions of the heating flues and drains; and the polished syenite columns and the carved capitals which carry the roof of the principal reception room have been cleaned of the whitewash which defaced them. Even before these restorations,—or, rather, cleansings, for nothing whatever has been renewed or added—were carried out, that great authority on Moorish subjects, Mr. Budgett Meakin, wrote to the *Gibraltar Chronicle* under date March 16th, 1906:—"Except in the Alhambra there is nothing in Spain to compare with it; and in Morocco such baths may not be entered by Nazarenes or Jews, so that its interest is exceptional." The central room (which was probably the shampooing room with raised divans behind the rows of columns) has a 16-sided vaulted roof carried by horseshoe arches on polished syenite columns. In the roof of this and of other rooms are numerous star-shaped light-holes similar to those in the Alhambra and in the little bath in the Tower of Homage in the Castle, while in the steam chamber there are plain round holes. Probably the original entrance to the suite was in the western room (now used as a stable) and not in the central room as was surmised by Mr. Meakin, who only saw the place before it was opened up and the doors of communication discovered and reopened. The tiles or marble slabs with which the floors, baths, and divans were no doubt originally covered have entirely disappeared. The heating chamber has not been discovered, but the slope of the flues seem to indicate that it was probably under the present stables.†

The Church of "Our Lady of Europa."

Opposite to the Artillery Guard Room on Europa Flats there stands a strange-looking little building which is one of the oldest on the Rock and one which in its history epitomizes the principal vicissitudes of Gibraltar. It is a fragment of an old Moorish building which Colonel James, in his *History of the Herculean Straits* (p. 326) states "was in all probability either a Mosque or a Saint House." Montero (p. 278) says "The building was Moorish and had a good tower which doubtless had served the Moors as a fort." The tower no longer exists; and there does not seem to be any description of

* A kind of concrete used by the Moors.

† Three letters from Mr. Budgett Meakin on the subject of this bath appeared in the *Gibraltar Chronicle* of March, 1906, and one from the author of this book in June, 1908.

Digitized by Google

the building in Moorish times. Ayala speaks of the tower as perhaps having been the minaret, but as having been restored in modern style. The Spaniards converted the building to Christian uses. Both Ayala and Montero in describing the Turkish piratical raid of 1540 speak of it as a "hermitage," and state that it was sacked by the Turks. At the capture of the place in 1704 by the British it was the Chapel of the Virgin of Europa and is spoken of by Montero as "the most ancient and venerated of all the sanctuaries. . . . Its chapel was adorned with sumptuous and rich gifts of the admirals of squadrons and enjoyed great privileges." Ayala (p. 32) gives a long quotation from Portillo who speaks of it as having been the scene of many miracles of some of which he had himself been a witness, and as having received many gifts from the residents and silver lamps with an endowment of oil from the "generals of the galleys." Portillo enumerates several of them, commencing with a lamp given in 1568 by Juan Andrea Doria, the son of the famous Genoese admiral and himself the commander of one wing of the Christian fleet at the Battle of Lepanto. Ayala adds that the church was enlarged to almost twice its original size. There can be no doubt that the existing structure is but a small fragment of what existed formerly. After the capture of Gibraltar by the English this chapel was converted into a guard room, and it may be that the tower mentioned by Ayala and Montero was then removed, but it seems more probable that it and other parts of the building were removed or destroyed in September, 1779, when all towers in the town were pulled down to avoid affording marks to the enemy's artillery. James speaks of it (Vol. II., p. 310) as a Captain's Guard in his time (1771). Drinkwater, who states that two powder magazines in front of the South Barracks "were the chief, I might say almost the only, buildings remaining on the Rock after the late siege," (p. 35) says "opposite the guard-house may be traced the remains of a building erected by the Moors, but used by the Spaniards as a chapel and called Nuestra Señora de Europa." It seems therefore a legitimate inference that when he wrote (1785) the Guard had been moved across the road to its present position and that besides the existing Moorish building there were ruins which afforded traces of the more extensive structure which have since entirely disappeared.

In the Chapel of the Little Sisters of the Poor is a statue of the Virgin which is said to be the one which was originally in the Chapel of the Virgin of Europa.

Subsequently the building became a store room, but in 1908 it was cleared of its contents, and a partition wall of comparatively modern construction was removed, so that it now consists of only one room instead of two as when described by Colonel Dewing, R.E. It remains simply as an interesting structure, no longer desecrated as a guard room or oil store although not restored to any sacred use.

Digitized by Google

The "Nuns' Well."

This is an underground tank, probably of Moorish origin, underneath the old Brewery Barracks. It is said to have been used by the nuns of the shrine of "Our Lady of Europa," and thus obtained its name of the "Nuns' Well." It is fully described by James.* Its roof is carried by rows of square brick arches; and the tank is now divided into two portions, one under that wing of the barracks which has been converted into a temporary church, and the other under the open yard of the barracks. The partition wall is shown by plans to have been in existence in 1815, while James' description shows that it did not exist when he wrote. Probably it was built as a foundation for the barrack wall above it, and therefore either in 1802–3 when the brewery was built or in 1804–5 when it was taken into use as a barrack. The entrance which was by steps is spoken of by James as having fallen in but the sketch plan of the "spot" granted to Mr. Douglas for the brewery seems to indicate it as having been in the middle of the north wall.

* Vol. II., p. 326, and Ayala, p. 34.

(*To be continued*).

Digitized by Google

MAJOR-GENERAL SIR WILLIAM REID, R.E., G.C.M.G., K.C.B., F.R.S.

(*Continued*).

By Col. Robt. H. Vetch, c.b., late R.E.

The correspondence bearing on the placing of Major Reid, R.E., and Capt. Colquhoun, R.A., on temporary half-pay to enable them to proceed to Spain to take up commands in the British Legion in 1835, which has been already referred to, has not been previously published and will, I venture to think, be read with interest.*

From Sir H. Vivian† *to Lord Palmerston.*‡

The King's disapproval of the arrangement to enable Major Reid and Capt. Colquhoun to serve with the Spanish Auxiliary Force.

"Ordnance Office, *23rd September*, 1835.

"My Dear Lord Palmerston,

"I regret to say that either the newspapers or some kind friend have so worked upon His Majesty, that in an interview I have just had with Him he stated His strong disapproval of Major Reid having been permitted to retire on temporary half-pay in order to enable him to serve with the Auxiliary Force, and commanded me to inform him that if he continued in that service, He never would consent to his being restored to full pay and resume his place in the Royal Engineers.

"At the same time the King authorized me to say that if he chose at once to return to his Corps, he was at liberty to do so.

"I have always been apprehensive of this.

"Nothing that I could say had any influence or effect on the King's determination.

"I put it to Him as strongly as I could that the same indulgence was granted by the Horse Guards, but the most I could obtain was permission that Reid might, if he chose, be immediately replaced in the rank he held. The King was in perfect good humour but very resolute. He ordered me to make a communication to the effect I have stated to Major Reid, and this I must do unless you will see the King on the subject, and can find means to persuade His Majesty to allow the present arrangement to stand, which I much fear you will find no easy job.

"During the discussion of the matter I foresaw this, and in my letter to Colonel Fox told him how it would be unless the King's consent were

* This correspondence is in the Public Record Office. See p. 93 August *Journal*.

† Lieut.-General Sir Richard Hussey Vivian (1775—1842), Bart., P.C., G.C.H., K.C.B., Colonel of the 12th Royal Lancers and Master-General of the Ordnance; afterwards first Baron Vivian of Glynn and Truro, G.C.B., and Colonel of the 1st Royal Dragoons. See *Dictionary of National Biography*.

‡ Henry John Temple, 3rd Viscount Palmerston (1784—1865), Secretary of State for Foreign Affairs; afterwards Prime Minister and Knight of the Garter.

Digitized by Google

first obtained. In reply he told me that you had undertaken to speak to His Majesty, and it was under the impression that you had done so that I gave in to the proposed arrangement; indeed, if I mistake not, Colonel Fox in one of his letters distinctly said you had mentioned it to the King; but, be this as it may, we are in a difficulty; as far as Reid is concerned he has the alternative of returning to his Corps; but as far as I am concerned, and indeed as far as the Government is concerned, it is very awkward, unless you can get over it.

"You can speak out to the King more than I could, because of the letters you have in which His Majesty expressly authorized Lord Hill being called upon to select officers to serve in Spain. You can therefore fairly say that you concluded the same authority applied to other branches of the Service, and consequently could not doubt His Majesty's approval of my doing the same. You will however know better how to manage than I can, but manage it you must somehow or other if possible, for if you cannot it will be a very awkward and unpleasant affair for all parties.

"Ever yours,
"H. VIVIAN."

"P.S.—I shall not write to Reid (or Colquhoun, who is in the same box) until I hear from you."

From Lord Palmerston to Sir H. Vivian.

"BROADLANDS, 24*th September*, 1835.

"DEAR VIVIAN,

"I will write to the King about Major Reid, and let you know the result.

"It would have a very bad effect, if he were now to be recalled by special order from the King.

"Fox was not quite correct in saying that I had undertaken to speak to the King about the arrangement for Reid and Colquhoun, as I understood him to say it was a matter of purely internal arrangement in the Corps, which rested entirely with the Master-General. I no doubt told him that I would take on myself any responsibility for having pressed it, which certainly I shall.

"Yours sincerely,
"PALMERSTON."

"There are three chances for Spain, Carlos, Isabella, and a Republic. The King certainly cannot wish for the first or the last, and yet he is unwilling to help the second."

From Lord Palmerston to Sir H. Vivian.

"BROADLANDS, 28*th September*, 1835.

"DEAR VIVIAN,

"I have a thousand apologies to make to you for not having sooner returned you the enclosed, but I have been working as hard here as if I had been in London. I write to the King on the same subject by to-day's post and shall be in town to-morrow.

"Yours sincerely,
"PALMERSTON."

"Fox misunderstood me as to my speaking to the King, because I did not understand from him that the arrangement required any special reference to the King."

Digitized by Google

From Sir H. Vivian to Lord Palmerston.

"29*th September*, 1835.

"My Dear Lord Palmerston,

"I had hoped to have heard from you on the subject of my proposed letter to Sir H. Taylor.* I conclude the delay arises from your having written yourself, as you said you should, to the King; but pray let me hear from you as soon as possible, as I am all this time postponing to act on His Majesty's commands and communicate His orders to Major Reid and Capt. Colquhoun.

"It will be a terrible stroke on the Auxiliary Force if those officers are recalled; it is, indeed, impossible to say what may be the effect; but I should apprehend the worst possible.

"I do hope, therefore, that you will manage to persuade the King to admit of their continuing to serve.

"Yours,

"H. Vivian."

From Sir H. Vivian to Lord Palmerston.

30*th September*, 1835.

"My Dear Lord Palmerston,

"I have desired Mr. Elliott to call on you and ascertain whether it will be necessary to send my letter to Sir H. Taylor; if His Majesty has attended to your representation and consented to Reid and Colquhoun serving with the Spaniards, that settles it, and perhaps if He has not it will be of no avail my saying anything more.

"In that case, however, both these officers would have to be recalled at once, if they are to be reinstated in the Corps; and this would on every account (I mean their recall) be a most disastrous measure.

"Pray see Mr. Elliott who will deliver this, and settle with him what I am to do.

"Ever yours.

"H. Vivian."

"P.S.—Fox has most unintentionally in some degree got us into this difficulty, in his anxiety to overcome that which existed, as to how we were to manage that these two officers were to serve without being lost to our Service.

"I pointed out to him that the proposed measure must be submitted to the King, in the same manner that I wrote to you respecting our giving any men, and Fox, in reply, either told me that you had undertaken to do it, or had done it. I am not certain which; but I think he merely said you had undertaken to speak to the King about it."

* Lieut.-General Sir Herbert Taylor (1775—1839), G.C.B., K.C.H., Private Secretary successively to George III., Queen Charlotte, and William IV., and First and Principal Aide-de-Camp to Queen Victoria. He was at different times Military Secretary at the Horse Guards, Surveyor-General of the Ordnance, and Adjutant-General of the Forces. See *Dictionary of National Biography*.

Digitized by Google

From Lord Palmerston to Sir H. Vivian.

"FOREIGN OFFICE, *2nd October*, 1835.

"MY DEAR VIVIAN,

"I wrote to the King and got an unfavourable answer; but I am returning to the charge, and have written Him another letter which I shall send Him this evening. I propose to Him to split the difference and to suspend the communication to Reid and Colquhoun for the present. If He does that the thing will drop; but I found from a few words I had yesterday with Lord Hill, that he (Lord Hill) has got a notion into his head that if the Legion were well found and equipped, it would be too successful and rival the British Army, that Evans would go afterwards to Madrid and be loaded with honours that would make him dangerous.

"I could not have believed if I had not heard it with my own ears that a grown man could have talked so childishly. But this is the sort of stuff which is crammed into the King's ear every day.

"Then Evans's foolish order about promotion from the ranks has been taken hold of, as if quantities of officers in the British Army had not risen from the ranks, among them I have always understood Elley, Whitelock, and David Dundas.

"Yours sincerely,

"PALMERSTON."

"P.S.—I have settled with Elliott that there is no use in his sending Taylor your letter as the matter now stands."

From Sir H. Vivian to Lord Palmerston.

"TEDWORTH, *3rd October*, 1835.

"MY DEAR LORD PALMERSTON,

"I sincerely hope you will have been able to arrange with His Majesty in the manner you have proposed.

"I can well understand the language you mention having been held by the party named, and the stuff which is poured into the King's ear on the subject. But after all what are we to understand from all this? That it is more desirable that a corps of 10,000 British should fail and be disgraced, than that any individual should add to his character that which might occasion his attaining higher estimation in the opinion of the world.

"Evans's order was I admit a most imprudent one, and pointing directly to the British Army, a most offensive and unjust one.

"You are quite right in saying that from our ranks many excellent officers have sprung. I am not clear that Whitelock and Dundas did. I rather think not, for Dundas was originally intended for a surgeon. Elley did and hundreds I may say of others during the late war. At one time when I commanded the 7th Hussars I had given six adjutants from its ranks to different regiments of cavalry. Still, if we were to go to war to-morrow and serve with a French army, we should be obliged to extend the provision still further of promoting non-commissioned officers to commissions, or discontent would arise, and Evans's order is well calculated to create such feelings.

"Therefore seeing the support he has received he is very wrong in issuing it. I am quite satisfied that my letter to Taylor was not sent; it

Digitized by Google

might have led to further questions; but Fox certainly must have made a mistake about a communication to the King.

"It was true that the reference was with respect to a question not in your department; but as I was out of town, and as the request came from you and I may say, so coming from the Government, as the step to be taken was a new one, I told Fox (as I told you afterwards in regard to the permission of men to enlist) that the King must be made acquainted with it, before Reid and Colquhoun were placed on half-pay in the manner proposed; and his answer was to the effect I have stated, either that you had mentioned, or would mention, it to His Majesty. However, it is no matter. We must now get out of it as we can, and I hope you will be able to tell me, in answer to this, that these officers are to continue to serve.

"Ever yours,
"H. VIVIAN."

From Sir H. Vivian to Lord Palmerston.

"*4th October*, 1835.

"MY DEAR PALMERSTON,

"Mr. Elliott will call with this in order to learn whether you have obtained the King's authority for Reid and Colquhoun to serve in Spain. If not, he must at once send off the letters of recall. I can no longer delay carrying into effect the King's commands.

"Ever yours,
"H. VIVIAN."

Then follows a paper in the King's handwriting.

"The King directs the Master-General of the Ordnance to furnish His Majesty with whatever correspondence may have passed relative to Major Reid of the Royal Engineers and Capt. Colquhoun of the Royal Artillery, relative to *these* officers being placed on half-pay.

"WILLIAM R.

"CASTLE WINDSOR, *4th October*, 1835."

From Lord Palmerston to Sir H. Vivian.

"STANHOPE STREET, *5th October*, 1835.

"MY DEAR VIVIAN,

"I have failed in persuading the King to alter his decision about Reid and Colquhoun, and I send you the correspondence which has passed between Him and me on the subject. Return it to me when you have read it.

"I went down to Windsor on Friday to meet Leopold, and went with Leopold on Saturday as far as Dartford to talk over various matters and did not get back to town till late in the evening; so that I could not sooner send you the result of my endeavours.

"Yours sincerely,
"PALMERSTON."

From Sir Hussey Vivian to the King.

"*5th October*, 1835.

"The Master-General of the Ordnance presents his humble duty to Your Majesty and in conformity to the command contained in Your Majesty's memorandum of the 4th has the honour to submit the only

Digitized by Google

correspondence which has passed relative to Major Reid of the Royal Engineers and Capt. Colquhoun of the Royal Regiment of Artillery being placed on half-pay. Your Majesty will observe that this correspondence consists solely of Major Reid's first application to be allowed to enter the service of the Queen of Spain, and of the letters directing these two officers to be placed on half-pay.

"The Master-General must explain to Your Majesty in reference to the application of Major Reid, that, before leaving London on a tour of inspection, he had pointed out in verbal communications with that officer the many difficulties in the way of his attaining his wishes, so strongly that he had given up thoughts of entering the Auxiliary Force. Whilst absent from town the Master-General received through Lieut.-Colonel Fox an application from Lord Palmerston, pressing him in the strongest terms to permit Major Reid and Capt. Colquhoun to retire on temporary half-pay. Thus called on by one of Your Majesty's principal Secretaries of State, and having ascertained that by the General-in-Chief no difficulty was made in allowing officers of the Line to retire on half-pay to enable them to enter the Spanish service, the Master-General looking to the great military claim of these officers, to the claims of the corps to which they belonged, and unwilling to withhold from them an indulgence accorded to their brother soldiers, assented to the proposed measure, which was in fact the only one by which their services could eventually be retained for Your Majesty.

"At the same time, however, he expressly stated in a communication to Lieut.-Colonel Fox that Your Majesty's pleasure should be taken on it; and in reply he understood that Lord Palmerston had spoken, or would speak to Your Majesty on the subject.

"It was under such circumstances and with such feelings that the Master-General permitted Major Reid and Capt. Colquhoun to retire on temporary half-pay. The communications in the Master-General's absence were carried on verbally between Lord Palmerston, Major Reid, and Lieut.-Colonel Fox.

"That there was some mistake there can be no doubt, as it appears that no communication has been made to Your Majesty; in saying this the Master-General has no desire to place on others the responsibility properly attaching to himself. In a peculiar case of this sort it was his duty to have fully ascertained that Your Majesty's pleasure had been taken; and if whilst endeavouring to do that which he believed to be in conformity to Your Majesty's views, which he knew to be those of Your Majesty's Government, he has had the misfortune to incur Your Majesty's displeasure, it will ever be to him a subject of the deepest regret, and his only consolation will be in the hope that Your Majesty will do him the justice to believe he erred most unintentionally.

"The Master-General has directed a letter to be written to Major Reid and Capt. Colquhoun of which a copy is transmitted to Your Majesty.

"The Master-General fears the effect of this communication will be to lose to Your Majesty's Service these most valuable officers, and he presumes to express a hope that as under an impression that it met Your Majesty's approbation, they were permitted to retire for one year on temporary half-pay to accept service in the Auxiliary Legion, Your

Digitized by Google

Majesty will in Your kindness be graciously pleased to reconsider their case and admit of their continuing to serve during that period, rather than call on them to do that which, through a point of honour on their part, they may deem it inconsistent with their character to do, and the consequence of which may be to blight their prospects in Your Majesty's Army.

"The Master-General begs to explain to Your Majesty that he has delayed until now transmitting Your Majesty's commands to Major Reid and Capt. Colquhoun, having understood from Lord Palmerston that his lordship hoped to induce Your Majesty to rescind them."

A letter was accordingly written on the same date to the two officers concerned informing them that the King having expressed Himself in terms decidedly adverse to the arrangement for placing them on temporary half-pay, reserving their places in their respective Corps, it could not be carried out. They were told that if permitted hereafter to return to the Service it would only be allowed on condition of placing them at the bottom of the list of their rank, but if they were returned at once they would be replaced in the regiment or corps respectively in the situation they occupied on being placed on temporary half-pay.

On the 9th October Sir H. Taylor wrote from Windsor Castle to Sir H. Vivian by order of the King accepting his excuses for the misapprehension that had occurred and continues :—

"But His Majesty retains His objections to what has been done contrary to His orders and intentions, though with His *supposed* sanction, and therefore approves of the communication made on the 5th instant to the two officers in question, nor will he recede from it.

"His Majesty is aware that no objection was made to officers on half-pay entering service in the Legion for the Queen of Spain, and that some few of the Line had exchanged to half-pay for that purpose, but it was clearly understood that the latter would thereby place themselves in the situation of all other officers on half-pay, and would retain no claim to be restored to the commissions which they thought fit to quit for another service, and His Majesty does not think proper to authorize with respect to the Corps of Royal Engineers and Royal Artillery an arrangement which would give to the officers of those corps an exclusive advantage which His Majesty denies to others and disapproves in principle.

"It must indeed be observed that if the officers of the Army *in general* were permitted to take service in Spain or elsewhere for a year, more or less, and then to resume their regimental stations, the privilege might be taken advantage of to a very inconvenient and embarrassing extent and introduce a novel system in the Service.

"Ever yours sincerely,
"H. Taylor."

From Sir H. Vivian to Sir H. Taylor.

Stoneham Park, Southampton, 11*th October*, 1835.

"My Dear Taylor,

"The receipt of your letter of the 9th has afforded me the greatest pleasure and I beg of you to present my humble duty to His Majesty and express my best thanks for His kind consideration.

Digitized by Google

"I cannot at all understand how it happened that no communication was made to His Majesty at the moment of Major Reid's being placed on half-pay, beyond submitting the papers for the promotion in succession as in ordinary cases, as I find by a private memorandum of Major Reid's that he expressly desired His Majesty's sanction might be obtained.

"That I considered it necessary is proved by the fact that when I had no longer Lieut.-Colonel Fox to correspond with, I, in my communications to Lord Palmerston (in reply to his lordship's application for the discharge of some men) expressly stated that I could not meet with his wish without the express commands of the King, and this was precisely a similar case and consequently I was certain to have acted in the one, in the same manner as I did in the other; however His Majesty is kind enough to attribute the omission to misapprehension, and I refer to it principally to show that Major Reid, by whom the consequences will be most severely felt, must stand entirely acquitted of any want of consideration as to what might be his Sovereign's wishes on the subject.

"There is still a question arising out of this business that I shall be glad to take His Majesty's pleasure on, it is this—Major Reid and Capt. Colquhoun are now *actually on half-pay* and can only be restored to full pay on a vacancy occurring; such vacancies may occur to-day, or may not occur for 12 months. Does His Majesty insist on their returning to this country at once? or will He be pleased to admit of their remaining absent until such a time as an opportunity offers of re-appointing them?

"I cannot do the officers who have been promoted in succession the injustice to put them back into their former ranks, so that the two officers in question, unless allowed to remain where they now are, will lose the advantage of their own service, and that which they promised themselves by their temporary retirement from it. In drawing the comparison between the officers of the Line and those of the Artillery and Engineers, it must always be recollected that in the one case the officers of the Line move from one regiment to another by purchase or otherwise, and that a captain of infantry quitting his corps to serve in Spain might to-morrow be brought back to full pay in some other regiment, and the following day be appointed to a majority. Whilst the officer of artillery if he sacrificed his place in his corps loses the benefit of his long services. The advantage, therefore, is at present all on the side of the Line, and it was to meet this, and at the same time to preserve to His Majesty two such highly meritorious officers as Major Reid and Capt. Colquhoun that I adopted the measure proposed of placing them on temporary half-pay. . . .

"Believe me, etc.,
"HUSSEY VIVIAN."

On the 12th October Sir H. Vivian sent Lord Palmerston a copy of the letter he had received from Sir H. Taylor. He says: "You will see by the accompanying letter that His Majesty is relentless. In an answer to Sir H. Taylor I have pointed out the hardship this is on Major Reid, who I find in a note to Lieut.-Colonel Fox actually himself requested the King's sanction might be obtained." Sir H.

Digitized by Google

Vivian then gives the purport of his letter to Sir H. Taylor and concludes :—

"I cannot help thinking (entre nous) that unless some kind friend had stirred up the King on the subject we should have heard no more of it, for He not only signed the commissions without a remark, but on the following day (I believe) He signed the permission for Reid and Colquhoun to serve in Spain, also without a remark; however, if my last appeal fails there is nothing more I fear to be done."

From Lord Palmerston to Sir Hussey Vivian.

"FOREIGN OFFICE, 14*th October*, 1835.

"MY DEAR VIVIAN,

"I return you with thanks Taylor's letter. I wish the King may be persuaded by your last appeal to reconsider his decision, but I doubt it. People are apt sometimes to cling to a foolish decision with more pertinacity than to a wise one. It is quite evident that some enemy has been working upon the King's mind, and that the King now wishes that Evans's Legion should meet with defeat and failure. For I can't believe that if He really wished that corps to succeed He would adhere to so small a point of objection as that upon which He places the recall of Reid and Colquhoun.

"The officer of the Line who goes on half-pay to serve in the Legion, goes on temporary half-pay just as much as Reid and Colquhoun do, because that officer of the Line may, if he pleases, exchange back to full pay at the end of a year, or sooner if he likes.

"The distinction therefore which the King sets up is in truth not real or substantial. But even admitting that there were such a distinction, and that a greater degree of indulgence had been shown in these cases to the Artillery and Engineer officers than to those of the Line, what then? Why should that be a reason for recalling them?

"The Ordnance Service, we admit, differs from the Line as to the facility of going on half-pay, we had therefore only to choose between doing a little less, or a little more for the Legion as to Ordnance officers, than was done for that corps as to officers from the Line; and surely there was every motive of national policy for doing a little more rather than a little less.

"Then again, supposing that an irregularity has happened by placing these two officers on half-pay without taking the King's pleasure; who is the King going to punish for that irregularity? those who committed it? No. But the officers themselves who were no parties to it; and the British Legion who knew nothing about it; and the Spanish Government and the Spanish Queen, who could hardly be made to understand what the irregularity consisted in, if we were to try to explain it to them.

"Yours sincerely,

"PALMERSTON."

From Sir Hussey Vivian to Sir H. Taylor.

RYDE, ISLE OF WIGHT, 15*th October*, 1835.

"MY DEAR TAYLOR,

"The accompanying letter from Capt. Colquhoun, R.A., has this morning reached me. I am delighted to find that submitting himself to

Digitized by Google

His Majesty's pleasure, he has determined on returning to his corps. The question which he raises as to his being permitted to serve with the Spanish Auxiliary Force until an opportunity offers of replacing him on full pay, is that I myself raised in my last letter to you. I shall therefore make no further observation on it, but I owe it both to Major Reid and Capt. Colquhoun to state my full conviction that in taking service with the Auxiliary Force, their great object was to improve themselves in their professional knowledge to render themselves more worthy of the service of their own Sovereign; and moreover I must do these officers the justice to say from all I can learn that they cannot in any way be deemed parties to the circumstance of their being desirous so to serve not having in the first instance been mentioned to the King.

"Major Reid, who acted for both, having expressly requested that His Majesty's sanction should be obtained before he was placed on temporary half-pay.

"Ever, my dear Taylor,

"Very faithfully yours,

"HUSSEY VIVIAN."

From Sir Hussey Vivian to Lord Palmerston.

"BRIGHTON, 16*th October*, 1835.

"MY DEAR LORD PALMERSTON,

"I have not heard from Taylor in reply to the letter I mentioned having written, and yesterday, forwarding a letter from Capt. Colquhoun, I again came to the charge and used in both my letters (although I fear not so forcibly and well) the very arguments you have used in yours I this morning received. I have some hopes His Majesty may yet relent, although with you I doubt it.

"The truth is that the plea of not having been consulted is one to serve the purpose; placing officers on temporary half-pay was a new measure and one in which no doubt it would have been proper to consult the King, but unless influenced by other circumstances His Majesty would never have resisted it in the manner He has done, or is doing, to the prejudice of a Corps of which He is very fond, and whose claims He readily admits; or of officers who in truth are at least entirely exempt from any suspicion even of being wanting in respect.

"Perhaps Lord Melbourne may be able to do something with our Sovereign if he would but try. I will call on you on Monday or Tuesday.

"Ever, etc.,

"H. VIVIAN."

From Sir H. Taylor to Sir H. Vivian.

"WINDSOR CASTLE, 17*th October*, 1835.

"MY DEAR VIVIAN,

"I duly submitted to the King your letter of the 11th and the enclosures which I return, and it has proved quite satisfactory to His Majesty. He orders me to say that He entirely acquits Major Reid and Capt. Colquhoun of having anticipated His objection to the step which they took. The latter has been with me to say that in consequence of the intimation which has been made to him, he has abandoned the intention of joining Colonel Evans's Corps, and His Majesty trusts there will be no difficulty

Digitized by Google

in restoring him to his station in the Artillery. Should Major Reid at once return, he would in the King's view be entitled to the same privilege, but not otherwise.

"The King admits that the officers of Engineers and Artillery who go on half-pay for any object of service or employment which may not be compatible with the duties of His commission, do so at much greater disadvantage than the officers of the Line, but this results from the general character and composition of the Corps and its regulations, and the difference, although it may impose greater restriction on the officers of Engineers or Artillery, does not affect the general principles for which His Majesty contends as indispensible, namely, that no officer who quits His commission for the sake of employment in another service can be allowed to do so temporarily and to resume his effective station in His Majesty's Service when the fancy for the foreign service has subsided.

"Believe me to be ever,

"My dear Vivian,

"Yours very sincerely,

"H. TAYLOR."

"P.S.—Since I closed the letter, I have received yours of the 15th, enclosing one from Capt. Colquhoun which I return.

"I have submitted both to the King."

From Sir H. Taylor to Sir H. Vivian.

"WINDSOR CASTLE, *29th October*, 1835.

"MY DEAR VIVIAN,

"I return the letter from Major Reid of the Royal Engineers which I have submitted to the King, who has expressed himself much satisfied with the very proper manner in which that officer has received the intimation of His Majesty's pleasure, and quite disposed to appreciate the feeling which prompts him to sacrifice his station in the Corps of Royal Engineers rather than quit a corps which he has actually joined in the field.

"Under this circumstance and certain as the King also is that Major Reid would not have proceeded to Spain, and engaged in the service of the Queen of Spain unless he had felt assured that the understanding that he should be placed on temporary half-pay had been sanctioned by Him, His Majesty is pleased to view the case of Major Reid as a *special* case and to consent to his being placed upon temporary half-pay for one year, at the expiration of which he must rejoin his Corps, or be placed on permanent half-pay. But His Majesty disapproves so much of the possible introduction of the practice of allowing officers of going temporarily on half-pay with the privilege of resuming their station in regiments or corps that He positively forbids the proceeding in the instance of Major Reid being admitted as a precedent, as also the holding out to any other officer on full pay of the Royal Engineers and Royal Artillery the expectation that His Majesty would be induced to sanction his retirement on temporary half-pay for the purpose of engaging in *any* foreign service.

"Capt. Colquhoun having, in consequence of the communication you were desired to make to him, abandoned the intention of proceeding to

Digitized by Google

Spain, may resume his station in the Corps of Royal Artilllery as soon as the vacancy shall offer, and, in the meantime, may agreeably to your proposal, which His Majesty has sanctioned, be employed on the particular service which the communication through Lord Palmerston has suggested.

"Believe me, etc.,
"H. TAYLOR."

Memorandum of Sir H. Vivian of 1st November.

"To the (above) letter Sir H. Vivian returned an answer (written at Windsor the same evening, copy of which was not kept) to the effect that his authority as Master-General was so implicated unless His Majesty consented to the arrangement in regard to Capt. Colquhoun being carried into effect, that he did not see how he could continue to hold office, and begging Sir Herbert, therefore, to press on His Majesty's notice the situation in which he was placed, in addition to any other arguments he might think it desirable to use."

From Sir H. Taylor to Sir H. Vivian.

"MY DEAR VIVIAN,

"I hope I shall succeed, but you have given me a very hard job and Fox and Lord P. must not play their tricks again.

"Ever yours,
"*2nd November*, 1835. "H. TAYLOR."

From Sir H. Taylor to Sir H. Vivian.

"MY DEAR VIVIAN,

"I did enquire for you but was told you were with the King and I desired Lord —— to tell you the unfortunate result of my application this morning, and that I was cut quite short *very decidedly*, but I will try again to-morrow morning though I despair.

"I also told Lord F. you would find me here any time in the evening if you could get away. I will write to Lord M. about the memorial, etc.

"Ever yours,
"Midnight." "H. TAYLOR.

From Sir H. Taylor to Sir H. Vivian.

"BRIGHTON, *3rd November*, 1835.

"Appd.
"WILLIAM R.

"MY DEAR VIVIAN,

"I have submitted your letter to the King, and I have received His Majesty's commands to acquaint you that notwithstanding His continued feeling of objection, and His disapprobation of the early proceedings in the cases of Major Reid and Capt. Colquhoun, His Majesty consents to extend to the latter officer the same indulgence which has been granted to the former, namely to be placed on *temporary* half-pay for one year, during which he may serve the Queen of Spain, at the expiration of which, if he should continue in that service he must be placed on *permanent* half-pay.

"But His Majesty desires it may be clearly understood that His Majesty is pleased to waive His objections in these two instances only, and that

Digitized by Google

He has done so at your earnest request and out of consideration for you, in consequence of your department having been committed during your absence to the introduction of a principle and the adoption of a measure which had not obtained His Majesty's sanction, and of which He is determined on no account, and in no other case to admit the establishment and the recurrence.

"His Majesty desires this may be clearly stated in an order to the Corps of Royal Engineers and Artillery, in order not only to prevent misapprehension and to discourage future expectations, but that, while he considers the feelings of others and upholds the authority of their superiors, who had, as before observed, committed themselves under the erroneous impression that they did so with His sanction, He may not Himself incur the imputation of weakness and inconsistency, or risk the possible interpretation of an act of grace into a concession.

"To the principle, as before said, the King maintains His objection, nor has anything you have said shaken it. That there is considerable difference in the situation of officers of the Ordnance Corps and those of the Line, His Majesty admits, but this does not remove the objection of facilitating to the officers of the British Service the practice of engaging in any other service to an extent which might become extremely inconvenient, and His Majesty believes that however you may attempt to maintain the principle, you would be puzzled to suggest how it should be regulated, or where the line should be drawn, as half the officers of corps would have just as much reason to expect compliance and to consider refusal a grievance as two.

"You have indeed alleged the greater inconvenience of allowing the continued absence of officers on full pay from their corps when employed on the Staff, or in official situations, and His Majesty admits the inconvenience to corps, but He orders me to observe with respect to Sir Stephen Chapman and Sir William Gosset, and any others so employed that they are serving their own Sovereign and not a foreign Crown and that He considers this contrast to be yet more strongly marked in the present instance, the corps in which officers so detached obtain high rank and pay being a corps of mercenaries commanded by an individual who has not established claims to the King's confidence in his loyalty, and who has since he has assumed the command not scrupled to issue and publish a General Order calculated to excite discontent and disaffection in the lower ranks of the King's Army.

"The King did not object to Sir William Gosset holding a civil situation in Ireland and retaining his full pay and station in the Corps of Royal Engineers, inasmuch as the situation in question was of a character which might render his continuance in it of short duration, but Sir William Gosset having lately obtained a civil office of a *permanent* character, His Majesty considers his continuance on the strength of the Corps of Royal Engineers to be incompatible with it.

"Believe me, etc.,

"H. Taylor."

"P.S.—I forgot to say that His Majesty entirely approves of Lieut. Du Plat of the Royal Engineers being sent to Constantinople in charge of the articles for the Sultan."

Digitized by Google

From Major W. Reid, R.E., to Sir H. Vivian.

"BRIEVESCA, *30th November*, 1835.

"Keep this.

"H.V.

"DEAR SIR,

"I have received to-night Colonel Fox's letter announcing to me officially that His Majesty has been pleased to allow me to remain here, and to resume my place on the expiration of my leave of absence, expressed by command in terms very gratifying to me.

"It was my intention, before I received this letter, to write and thank you for the very handsome expressions you used on my decision to remain, for which I am sincerely obliged to you; and it was also my intention to write to say how well we were going on, considering the difficulty of forming troops with so few officers and hardly any non-commissioned officers.

"We should have been further advanced now had the drill been carried on slower, and based on the squad and company drill from the beginning.

"To make up for the want of subalterns and non-commissioned officers, I am forming schools of mutual instruction on the Chatham principle, and by degrees we are getting our books and accounts into order. For instance, on inspecting the 3rd Regiment yesterday, commanded by Churchill, I found them very nearly perfect and not a single complaint. Disorders of all kinds are promptly repressed, and although I have been anxious to see flogging done away with, if possible, in the English Army, I am firmly of opinion that we could not have brought the levies, brought out here, into their present state without it; and particularly without the provost-marshal system.

"General Evans is very popular with the Spaniards of all ranks. We march to-morrow morning for Vittoria. When there we shall enable the garrison to join the active army; and our position in the centre of operations, even whilst drilling, will no doubt have a considerable influence.

"The cavalry look well, but have much still to do in the way of equipment and exercise.

"For the Artillery Service we are very anxious about the decision regarding Colquhoun.

"I hope I shall not even require all my year's leave to see Spain settled.

"You will I hope allow me the honour and pleasure of occasionally letting you know what we are doing.

"Believe me, dear Sir,

"Yours with respect,

"WILLIAM REID,

"*Major, R.E.*"

Digitized by Google

MEMOIR.

MAJOR-GENERAL EDWARD RENOUARD JAMES, ROYAL ENGINEERS.

By Col. Robt. H. Vetch, c.b., late R.E.

I first met the late Major-General Edward Renouard James in May, 1872, at Malta. He was then a 1st Captain, but, on the 5th July following, all the 1st captains were made regimental majors; this rank became, for the first time, a Corps rank, 1st captains having previously been promoted to be lieutenant-colonels in the Corps without the intermediate grade. He arrived only a few days after me and remained in Malta until after I left the island in December, 1876. He was in charge of the Valetta Division the whole time. My work lay mostly away from Valetta, but I had a table in his room where I transacted defence work, military telegraphs and other business, and did company accounts and I, therefore, saw a great deal of James, who was a most indefatigable officer in looking after his district, and a pleasant companion with whom to share a room.

James was great at details, and he has recorded his own life for the benefit of his daughter and other relatives with great minuteness in several folio typewritten volumes, profusely illustrated, mainly by his own pen. These volumes have been lent to me by the kindness of Miss James for the purpose of this memoir.

He was one of those men who delight in patient, laborious work, in careful investigations, in elucidating problems, who are never so happy as when they are following a clue which they hope will lead them to the desired result. He had a great capacity for taking pains but his labours were not bestowed upon matters which were likely to bring him into public notice. He was partial to genealogy, and as he had himself a very interesting ancestry, he set himself the task of finding out all about them. His book on the subject of his forbears was privately printed. It shows much diligent historical research. His own interleaved copy is now before me, and many pages are filled with notes in his neat handwriting to further elucidate the text. Side by side with the family history which he wrote, was

Digitized by Google

the collection that he made of old portraits of his forefathers. Many of his friends will remember some of these interesting old portraits of the Ott family, with which he adorned his dining-room in the flat at Earl's Court, where he lived for many years before his death.

In this memoir I cannot do more than refer very briefly to his ancestors, who are to be found under the surnames of James, Gardner, Fyers, Renouard, Ott, and St. Pierre. Their pedigrees are given in the privately printed book already referred to, and go back respectively to the following dates :—A.D. 1524; 1650; 1620; 1550; 1350; and 1320.

In the direct line General James traced his descent from Benjamin James, a merchant of Austin Friars, London, who was born in 1656 and died in 1740. He believed, and seems to have had good ground for doing so, that this ancestor was the great-grandson of Roger James, van Haëstrecht, of the ducal family of van Haëstrecht of Utrecht, in the Duchy of Cleves, who established himself at Bow as a dyer and brewer, having probably fled to England on account of religious persecutions in the Netherlands. This Roger James was born in 1524 and died in 1591. He was buried at Allhallows, near Barking, in Essex, where his epitaph exists on a brass over his grave. His great-grandson, Benjamin James, the merchant of Austin Friars, married Elizabeth Henshaw, and their great-grandson, John James (born in 1771, died in 1850), married, in 1803, Annabella Renouard, a Huguenot, descended from Etienne Renouard of Sancerre, a small town on the Loire, between Orleans and Bourges in France.

The Renouard family were closely connected with another Huguenot family, the de St. Pierres, and also with the Otts of Zurich in Switzerland; the mother of Annabella Renouard, who married John James, was Mary Ott, daughter of John Henry Ott and of Elizabeth de St. Pierre.

John James and Annabella Renouard had a family of five children. The eldest of this family, also called John James, was born at Guildford, Surrey, in 1807. He married in 1829 Susan Amie Gardner, born in 1810, daughter of General the Hon. William Henry Gardner, Colonel Commandant, Royal Artillery, and of his wife, Elizabeth Lydia Fyers. He was the father of the subject of this memoir, who, it may be noted, was, on his mother's side, a member of the Fyers family, being the great-grandson of Lieut.-General William Fyers.

John James went to Sandhurst and obtained a commission in the 85th Regiment (King's Own Light Infantry), from which he retired in 1837, as a Captain, after 12 years' service. This was in the early days of railway construction in England, and Capt. James left the Army to obtain employment under Isambard Brunel as a railway engineer. His marriage with Miss Gardner had already taken place while he was with his regiment at Malta in 1829. Major-General James refers to his father in his family notes. He says:

Digitized by Google

"My father was employed in the construction of the Great Western Railway and its branches, of the Box Tunnel, the Bristol and Bridgewater, Taunton and Exeter, and Oxford and Rugby Extensions. My own boyhood was consequently passed in a variety of homes; and in watching my father's work I gained technical knowledge, which doubtless stood me in good stead in after life. After my birth at Manchester in 1833, and before my father left the Army, we were at Jersey. We lived afterwards at Hutton, Weston-super-Mare, and Wellington in Somersetshire, Exmouth in Devonshire and at Banbury in Oxfordshire. My father was one of the most ardent sportsmen I ever knew, and revelled in the enjoyment of country pursuits; so that my early recollections are of shooting, fishing, hunting, and tandem driving in his genial company. . . . He died in 1850 from the effects of a hunting accident at the early age of 42 years. I was at the time a Woolwich cadet. He was buried in the family vault at Lee, Kent, and I well remember that his loss was the first bitter grief of my life. My dear mother survived him more than 40 years and was buried at Bournemouth in 1891."

Major-General James was born at Shalford, Manchester, on the 23rd July, 1833. He was prepared for Woolwich in 1847 and 1848 at Mr. Quarterman's school at Woolwich (afterwards Mr. Hopkirk's and removed to Eltham). He entered the Royal Military Academy on the 10th April, 1848, fifth on the list. He mentions that during the Chartist riots of that year the Woolwich cadets were under arms, and ball cartridge was served out. The head of his room was Cowell, afterwards Sir John Cowell, Controller of Queen Victoria's household, who continued to be James's good friend until Cowell's death in 1895. "At no period," says James, "had bullying at public schools reached such a pitch as at Woolwich in 1848 and 1849. This is recorded in the literature of the time and I could tell some remarkable stories of the cruelties I endured myself."

James got his commission in the Royal Engineers on the 17th December, 1851, and was under instruction at Chatham for two years. He took to boating as a recreation and he mentions the old cutter *Whim* and the oft-told experience of running her on the mud on an ebb tide, and spending the night there until the rising tide freed her again. At Woolwich James had a chum in Charlie Gordon, who joined at Chatham six months after him. They were thrown together later in the Crimea and in boundary work, both in Europe and Asia; afterwards they corresponded from time to time and remained firm friends until Gordon's tragic death at Khartoum in 1885.

From Chatham James was sent to Alderney, where Capt. (afterwards Lieut.-General Sir) William Jervois was Commanding Royal Engineer, and had under him a staff of young officers who made their mark in the Corps. These were Major-General Sir Charles Nugent, Colonel Joshua Smith, Colonel F. E. Cox, Major-General

Digitized by Google

C. E. Martin and Colonel Pratt. This large number of officers in the little island of Alderney was required in order to design and superintend the construction of the works of defence for the new harbour, then in course of making by the Admiralty. The breakwater to form the harbour cost a very large sum of money, was greatly damaged by storms, and has, for some time, been allowed to fall into ruin.

James gives the following account of his stay at Alderney :—

"Our time at Alderney was usually fully employed in the office or in visiting the works in progress. Sources of amusement were so limited that there was little temptation to neglect our duties. Our chief, Jervois, . . . was very strict and made us work hard, but he was the only married officer among us and was most hospitably inclined, so that after office hours we were sure of a kind reception at his house, both from himself and from his charming wife. Other society in the island was limited to three families :—those of the Town Mayor, or quasi-Governor, Le Mesurier; the Judge; and the Rector. Mr. May, the Admiralty Engineer, who was a great acquisition to our society, was unmarried. Public entertainments of any sort, except the Rector's sermons (and these were decidedly good), were unknown; after dinner we generally played a friendly rubber of whist, and retired to bed at an early hour. The mail from England arrived at uncertain intervals about once a week, being fetched from Guernsey by a little steamer belonging to the contractor. In stormy weather we were occasionally a fortnight without news from the outside world. . . . There was rough shooting along the cliffs at the back of the island, and sea fishing from an open boat in the rather dangerous channels surrounding the coast."

The impending war with Russia caused augmentations to be made in the Army, and the Corps received an increase of two battalions. Owing to this James became a First Lieutenant on the 17th February, 1854.

On the 30th June, 1854, James left Alderney under orders for Malta, the depôt to which troops were forwarded for the war with Russia. Embarking in the P. & O. steamer *Euxine* on 20th July he arrived at Malta on the 1st August. Sir William Reid, a connection of James, was the Governor, and Colonel Ringler Thomson was the Commanding Royal Engineer. James enjoyed his stay at Malta, which lasted for six months, but he was eager to get to the Crimea. It was not until the middle of February, 1855, that he was sent on to the Siege of Sebastopol.

With two senior brother officers, Capts. L. J. Armit and Whitworth Porter, he embarked in a very small screw steamer *Arabian* on the 14th February for Constantinople. After a short stay in that city he went on by a fine steamer the *Ottawa* to Balaklava. There he joined the 1st Company of Royal Sappers and Miners, employed in building

Digitized by Google

huts. On the 20th March he was moved to the front with this company, under command of Capt. (now Lieut.-General Sir) James F. M. Browne, and was employed at the Right Attack, soon receiving his baptism of fire in the trenches, where so many of his comrades were either killed or wounded.

James served in the trenches until the 2nd July, when an incident occurred which effectually stopped for a time his service in the field. Among the books and papers lent to me I find a *Lett's Diary* for 1855, in which James entered very briefly, and at intervals, what he had been doing during the day. I think that the following extracts will be read with interest, referring, as they do, to many brother officers who have since passed away :—

"*February 26th*, 1855.—Arrived off Balaklava about daybreak. . . . Armit went on shore to report. Went on shore myself and saw Browne, Carter, Keane, Martin, Drake, and Leahy. 1st Company, Browne and Carter, stationed at Balaklava. Drake on leave; Keane, commanding officer; Leahy quartermaster; Martin wounded.

"*February 28th.*—Received orders early to join 1st Company. Capt. Browne, Carter, and a doctor, Spittall, and Belson living in a wooden hut. Belson ordered to the front. . . . We are to be employed in building huts and other work about Balaklava.

"*March 2nd.*—Work: to parade at 8.30 to tell off working parties. Building huts for Croats and commissariat store at Kadikioi also convalescent camp on hill behind castle. Went to see Martin and found him improving.

"*March 8th.*—Rode up to Headquarters. Met Browne, Leahy, and Elphinstone there. Saw Bourchier and Cowell. Rode down together. Met my brother[o] at Kadikioi walking with Sale. Dined with him at Sale's house.

"*March 10th.*—My brother started after breakfast to walk to Kamiesch where his ship the *Megæra* is lying. Work as usual. Dined with Drake at Colonel Harding's, the Commandant at Balaklava. Party consisted of Harding, Drake, Fortes of the Austrian Service, commanding the Croats, and myself.

"*March 14th.*—Out to Kadikioi to visit the works. Rode to Karani to see the Cavalry Division races, extremely good for the Crimea. . . . Capt. Craigie, R.E., was killed last night by the bursting of a shell in the middle ravine.

"*March 16th.*—Carter and I rode up to the Right Attack and visited the trenches there. Owen on duty in the battery. The men working at first advance from 2nd parallel to communicate with the French. The Russian rifle pits render a part of this new approach very dangerous.

[o] John William James (b. 1831, d. 1877) in the Navy, afterwards a post-captain. He married his cousin Eleanor Gardner, who died in 1892, without issue.

Digitized by Google

Went over to Left Attack and afterwards to Headquarters and then home.

"*March 18th* (*Sunday*).—Early parade for service, Mr. Hayward, Chaplain. Work as usual. Received orders to go to the front to join the Right Attack with 1st Company under Browne.

"*March 20th.*—Left Balaklava for Right Attack. Pitched tent next to Drake's mess tent. Commenced digging hole for tent on the spot where Craigie's tent was. Dined with Major J. W. Gordon, R.E.

"*March 23rd.*—In the trenches by day. Arrived just as the fighting was over. Bodies lying in the advance mortar battery, both English and Russians. On the French side to our right, hundreds of bodies. Our loss about 30 killed and wounded. Major J. W. Gordon, R.E., wounded. On Left Attack Capt. Montagu, R.E., taken prisoner. At work in advanced trench with party of Sappers and Capt. Stanton, R.E. General Jones came down.

"*March 24th.*—Down to Balaklava. My brother sent me a sheep and some eggs. Back to camp in time for duty. Flag of truce to-day to bury dead. English, French, and Russians met in friendship on the advanced open.

"*March 29th.*—Capt. De Moleyns arrived at Balaklava to command the 1st Company. In the trenches by night. At work at new mortar battery on the right. Very quiet night."

On the last day of March there is entered a list of the R.E. officers and the Assistant Engineers which is as follows:—*Headquarters.*—General Jones; Lieut. Cowell, A.D.C.; Capt. Bourchier, Brigade-Major; Lieut. Stopford, A.D.C.; Lieut. Jamieson, Life Guards, A.D.C. to General Jones. *Right Attack.*—Lieut.-Colonel Tylden; Major J. W. Gordon; Capts. Stanton, Browne, King, Crofton, and Owen; Lieuts. Baynes, Graves, Anderson, Bainbrigge, Pratt, Drake, James, and Lowry; *Assistant Engineers.*—Capt. Green, E.I.C.; Capt. Garnet Wolseley, 90th; Lieut. Sheehy, 64th; Mr. Newsome, C.E. Adjutants, R.E.—Capt. Ewart and Lieut. De Vere. *Left Attack.*—Major Chapman; Major Bent; Capts. Hassard, Armit, Porter and Belson; Lieuts. Murray, Neville, Lennox (Adjutant), C. Gordon, Donnelly, and Graham; *Assistant Engineers.*—Lieut. Chapman, 20th, and Lieut. Penn, R.A.

"*April 2nd.*—In the trenches by day. A great deal of firing. The Mamelon opened on us 15 pieces. Mortar platforms destroyed by a mortar shell.

"*April 4th.*—Lieut. Bainbrigge killed last night by the bursting of a shell in the trenches. One leg not found. He was buried to-day.

"*April 7th.*—In the trenches by day. At work in left advance at not more than 150 yards from a Russian rifle pit. General Jones came down. Found Lieut. Bainbrigge's missing leg.

Digitized by Google

"*April 9th.*—General firing commenced from the siege trenches at 5.30 a.m. Rain falling in torrents and blowing hard. Five men killed and nine wounded. On duty at night. We kept up a constant fire of shells.

"*April 13th.*—Crofton badly wounded in the trenches yesterday. Leg not to be cut off yet.

"*April 15th.*—In the trenches by day. Firing getting slack, 7th day. Mending embrasures, etc., improving cover in left advance. One sapper killed by round shot. Capt. Greene, Scinde Horse, Assistant Engineer, wounded. Du Cane arrived in charge of telegraphs. Crofton died of wounds.

"*April 17th.*—In trenches by night. Advancing on left. Capt. King and three sappers wounded.

"*April 19th.*—In trenches to-night with Capt. Owen and Lieut. Baynes. Rifle pits taken by 77th, etc., and boyau established to enclose the nearest. Owen and Baynes both wounded. I received a canister shot through my cap. The enemy came on in force towards morning and regained one rifle pit. Colonel Egerton and Lemprière, 77th, killed.

"*April 22nd* (*Sunday*).—Service performed by Mr. Taylor, the chaplain lately appointed to the Royal Engineers. King died to-night at 11.30 p.m. The doctor reported after death that the wound must have been fatal, the bullet having entered the intestines.

"*April 23rd.*—Up at 4 to go to the trenches. At work strengthening advanced boyaux. A great many men hit. Truce for a short time to bury dead. Russians advanced from Quarry to do so. Very fine men.

"*April 24th.*—Poor King was buried near our camp; a large number of officers attended. . . . Owen and Baynes are both going on well."

Baynes rapidly got worse and died. Owen went home some time later having lost a leg above the knee. A considerable gap occurs in the diary which contains few entries beyond "Trenches by day," or "Trenches by night," and "Sorties," which were frequent in May, during the whole month.

"*June 6th.*—The fire from our batteries recommenced vigorously at 3 p.m. I went to trenches at 5 p.m. Two hours' firing had done a great deal towards silencing the enemy's guns. Mamelon only firing one gun on my arrival. Kept up a heavy fire from our batteries the whole night. Somerville with me, first time on duty.

June 7th.—Relieved by Capt. Dawson, R.E., and Major Campbell, 46th, at 4 a.m. Poor Dawson (lately married) killed in less than half an hour by a round shot. Wolseley sent down to do duty. Kept up fire all day. Magazine in No. 9, or Spur Battery, exploded. Obliged to use general's hut as temporary magazine. At 5.30 combined attack made by French and English on Mamelon and the Quarries. French successful after one repulse. English successful, but obliged to resist several attacks with great loss. Browne, Elphinstone, Lowry and Wolseley (90th) and

Digitized by Google

Anderson (96th) present. Lowry killed and Anderson wounded. Total *hors de combat* 630. Amateur in the batteries. [James was in the batteries looking on, being off duty].

"*June 8th.*—Relieved Elphinstone and Wolseley in trenches at 4 a.m. Quarries at present very dangerous. Could get no working party. Sappers at work in communication alone. Capt. Shearman, Major Dickson and Capt. Forster killed, and Capt. Ingall wounded this morning, all of 62nd. . . . Up to camp at noon and came down again after a few hours' sleep to get a working party from 4 to 8 p.m. Returned to camp very tired.

"*June 9th.*—Flag of truce this afternoon, for the bodies were becoming very offensive. The enemy have a kind of infernal machine by which I narrowly escaped being blown up. [He then describes a box which is buried, but has connection with a surface brass which, when trodden on, breaks a glass tube containing acid and explodes the composition in the box]. One or two exploded on the 7th inst. and one during the flag of truce to-day. We dug up about 20 of them about the Quarries. They cause bad burns, but are not otherwise very destructive.

"*June 17th.*—The Engineers have been extremely hard worked since the 7th, almost without ceasing. For myself I have not been a single day out of the trenches, being occupied in making a survey of the Russian works as best I can. We have been engaged every night in pushing forward from the Quarries and in turning some of the Russian trenches. The fire from our batteries reopened this morning. The French with 22 pieces from the Mamelon. The enemy did not return much fire after 2 or 3 hours. The Malakoff Tower appeared particularly knocked about. Our batteries very little damaged. Corpl. James, R.S. & M., killed this morning. Got back to camp about 6 o'clock. John (his brother) arrived from Kamiesch and Sale (Commissariat) from Balaklava. Both slept in camp in consequence of sudden news of storm early to-morrow morning. Nineteen Engineer officers on duty. I am to head central assaulting column (composed of part of 2nd Division) to destroy abattis and to make a passage for main column on salient of Redan.

"*June 18th* (*Waterloo Day*).—Left camp about 12.30 a.m. My party of 62nd Regt. and 15 Sappers to wait, until ordered to advance, in rear of 2nd parallel. Original orders for 2 or 3 hours' heavy cannonading, but about 3 or 3.30 a.m. heard commencement on French side, and Lord Raglan in 8-gun battery gave signal for our 1st and 3rd columns. The French attack not being successful on Malakoff did not allow 2nd Division to advance. Retired the whole in about 2 hours. Grape very heavy and casualties on our side very great. . . . Engineer officers: General Jones wounded; Capt. Jesse, Lieuts. Murray and Graves killed. Colonel Tylden shot through both legs. Major Bourchier slightly wounded. Naval Brigade carried ladders and suffered very severely. . . . With John down to Kazatch to sleep. . . . Very tired got on French cart and slept all the way to Kazatch. On board *Medina* saw Beresford, late of *Spy*.

Digitized by Google

"*June 19th.*—Up very early. Bathed off ship's side. Rode up to camp immediately. Called at Naval Brigade and met Tom Fellowes. Rode over to R.E. camp with him. Armistice this afternoon to bury dead. Took Fellowes down. Went within a few yards of abattis in front of Redan. Talked to several Russian officers. Very friendly. Naval officers much superior to military officers. Found bodies of Jesse and Graves and missing Sappers. Rode with Fellowes to see Hallewell and separated. Buried Jesse and Graves this evening at Right Attack. Browne is installed Director of Right Attack.

"*June 22nd.*—Disagreeable duty this morning—to see 2 sappers receive 50 lashes each. Have always avoided it before though I am sorry to say that it frequently occurs. On duty in trenches to-night.

This is the last entry, except "Trench duty," until the 2nd July, when the following entry occurs :—

July 2nd.—In the trenches to-night. Had some work at the bottom of the Woronzoff Ravine, placing *chevaux-de-frises*. Tried to take a short cut from the bottom of the Ravine to the Quarries, but, getting too far in front, walked into the Russian picquet, and as I had nothing with me but a useless sword, and it was too dark to perceive any chance of escape, I was obliged to give myself up quietly. I was led in by the right face of the Redan, by a covered sally port and after following several most winding, narrow, and sometimes subterraneous passages, arrived at last at the hut, or bombproof cover, where the Admiral in command of these works was sitting."

At first, to his horror, James was regarded as a deserter and asked what information he had to give ; his account of his capture was only partially understood—at that time he could not speak French at all well—and was regarded with some incredulity. As it was midnight, he was sent to Fort Nicholas, some two miles away, where he was given into the custody of the officer commanding the barrack guard ; this officer passed him on to General Keismer, the commandant of the fort, to be once more examined. He was then given in charge of an adjutant, in whose room he slept for the rest of the night. By this time it was 3 a.m. and James was so fatigued and ill—he had been suffering from dysentery which had made him very weak—that he dropped off to sleep, just as he was, in his coat and boots. When he awoke and remembered his sad circumstances, he says, he almost regretted his life had been spared in the trenches. After a visit from General Keismer, with an officer to interpret, he was summoned by a staff officer, Capt. Rumein, to go to Count Osten Sacken, the General Commanding the Corps defending that section of the fortress. Capt. Rumein spoke English well and had a courteous, gentlemanly bearing ; James was able to make him understand that he was not a deserter and was really a British Engineer officer, however little

Digitized by Google

like one he might look, for it was the custom on night duty in the trenches to wear very rough, old clothes. After his interview with Count Osten Sacken he was well treated, allowed to write a report at once to Sir Harry Jones, and to send for clothes and money. The Count also asked him to dinner. James writes :—

"The dinner with Count Osten Sacken was at 2 o'clock, and considering it was given in a besieged town, was very well served. There were about 20 at table. I sat on the General's right with Capt. Rumein next to me. I had to answer a variety of questions, and seemed to be the first to convey the news of Lord Raglan's death to the Garrison of Sebastopol, and to give the name of his successor in the command of the English Army.

"After dinner Rumein took me to see the famous General Todleben, the Chief Engineer in the splendid defence of Sebastopol, who at the beginning of the war had been a junior captain, but had been rapidly promoted in consequence of the ability he had displayed in designing and constructing the works that had so successfully arrested the advance of the allied armies. He was a handsome man who looked about 35 years old. I found him lying in bed, suffering from a wound in the leg received on the 18th June. He spoke very kindly to me while doing his best to pump me about the English siege works, but I hope he was not successful in extracting any information of any value from me . . . he became too seriously ill to be able to see me a second time . . .

"I was given a large casemate room to myself in the upper storey, with a wide window looking southwards towards the town and in the direction of the defences attacked by the Allies. . . . A sentry was mounted at my door and an old soldier, appointed to wait on me, was within call. . . . Lieut. Ferdinand von Stielau, of the 19th Regiment of Infantry, a young Livonian, who knew a few words of English, informed me that he had been ordered to take general charge of me, and that he would come to see me daily. I cannot forget how kind he was."

But in this notice of General James it is not possible to make many quotations. He was allowed to bathe in the harbour and to take exercise on the boulevards, always of course under surveillance, and except ill-health he had little to complain of in his captivity at Fort Nicholas. On the 23rd July, which was the 25th anniversary of his birthday, he was conducted to the north side of the harbour, landing at St. Catherine's Bay. He had been led to suppose that both more money and more clothes had been sent to him from the English camp, but they did not come. It turned out that the money was sent in English sovereigns and followed him about for the next four months, eventually reaching him after he had been released from captivity. In the meantime his only means to procure food consisted of the payment of 75 kopecks a day by the Russian Government at the current rate of exchange, or about half-a-crown a day.

Digitized by Google

His friend von Stielau bade him an affectionate farewell and he was handed over to the custody of a rough and rather brutal sergeant of gendarmes, who of course could not speak anything but Russian; they travelled by telega, the ordinary Russian cart on four low wheels, over which a small wooden body is perched without springs. James was in a very weak state of health and had difficulty in getting from his escort anything either to eat or to drink. Fortunately at Simpheropol he passed from the custody of the surly sergeant to that of a young Russian officer, who was to escort him the rest of the way, and he found that his destination was Riazan, a town a little south of Moscow, and nearly 1,000 miles from Sebastopol. He travelled for 16 consecutive days, passing through the following places:—Baktchi-Serai, Simpheropol, Perekop, Karovka, Berislav on the Dnieper, Woronzoffka, Nikopol, Ekaterinoslav, Nova-Moscov, Konstantinograd, Kharkhoff, Belgorod, Karotchi, Stari-Oskol, Nijni-Gevitza, Voronetz on the Don, Ousman, Liapirch, Kazuoff and Riajsk. He reached Riazan on the 7th August, having travelled an average of 61 miles a day. His journey had been rather a trial owing to his ill-health and the jolting in the telega, while his escort had turned out a very unamiable companion.

On his arrival James was sent by the Governor to the Chief of the Police, who directed him to wait at the hotel until he could attend to him. He waited several hours, and during this time some of the English officers, who were also prisoners of war at Riazan, called to see him; they told him that they had been most kindly treated, and were able to get money through the banking firm of Anderson at St. Petersburg. These officers were shortly to be exchanged, and were only waiting for the Emperor's reply to their request to be allowed to travel by way of Moscow. They were asking James to dinner at the moment when the Politz Maister arrived. He was very angry at finding the English officers had entered the hotel and had talked with James without permission. He ordered them out summarily, telling James that it was not desired that he should communicate with them, and he must keep his room until they left Riazan.

About a week later his brother officers, whose names he gives—Lieut.-Colonel Kelly and Lieut. Byron, 34th Foot; Capt. Duff, 23rd; Capt. Frampton and Lieut. Clarke, 50th; Lieut. Clowes, 8th Hussars; Lieut. Chadwick, 17th Lancers; and Messrs. Johnstone, Vicars, and Macarthy of the Commissariat—all started for Moscow, their exchange having been arranged. Although James was sorry to see them go, his own position was at once greatly altered for the better. He was given full liberty, with the only obligation to report personally to the Governor every day. The Governor, M. Novasiltsoff, was most friendly, and James was a constant guest at his and other houses in the town

Digitized by Google

and neighbourhood. He thus had an opportunity, which pleased him, of seeing Russian family life in various classes of society. He spent altogether a very agreeable time in this place of captivity. He was present at Droshky races held near the town, he was given some plover shooting, and went to the apple festival, a sort of fruit harvest thanksgiving; he also saw an alarming fire, which burnt down some of the finest buildings in the centre of the town. The novelty of the life and the kindness he received from everybody left a lasting impression on him. He was there barely six weeks, but he has much to say about the place and, indeed, about Russia generally, and he was really sorry to leave the friends he had made.

James was ordered to Odessa for exchange and left Riazan on the 15th September. He travelled in a post-telega in charge of a tchinovnik, who was a professor of music, and had orders to escort him as far as Toula. His route was entirely different to that by which he had arrived. He had first to travel some 60 versts along the chaussée to Moscow and then double back on the road to Toula. On arriving at Veneva he and his escort changed into a tarantasse, which is a much more comfortable conveyance than a telega. It is a four-wheeled vehicle in which the front and rear axles are connected by fir saplings (which, if broken, are readily replaced in any forest passed), at a distance apart of 20 feet or more. The long platform thus made gives the only spring which the carriage has, and the carriage body, which is generally hooded, rests in the centre.

At Toula, which after Kharkhoff was the finest town he had as yet seen in Russia, James put up at the best hotel, and after dinner his escort conducted him to the Governor and to the Police Master. They treated him well, told him he would remain in Toula for 24 hours, and placed an orderly at his disposal to show him the town.

He started from Toula on the 18th September, in charge of two Government employés who could speak no language that James understood. The route was the great military chaussée running south, wide and well made, and kept in excellent order; passing through Sergifskia and Tsienks, James arrived at Orel the next day. Here his escort was changed and he was placed in charge of an infantry officer, who is described as "a very agreeable, gentlemanly fellow who spoke French well." They got to Koursk at 3 a.m. on the 21st. There they found the Emperor was travelling south, and there was some hesitation as to whether James should be sent on or not. James was not sorry for a delay of a day as he had travelled 100 miles from Orel to Koursk in a post telega. So he spent the time in seeing Koursk, and in the evening, the Emperor being further back than was thought, he was sent on with a fresh escort "an ugly, fidgetty, little Pole who spoke bad French." He spent the night of the 21st at a post-house, and of the 22nd at

Digitized by Google

Belgorod. In the morning he found that the Czar had passed while he was asleep, much to his disappointment as he had hoped to have been able to see him. He was not allowed to leave Belgorod until 11 a.m. He had passed through this place on his journey up and now had an opportunity of exploring it before starting south again. Arriving at Kharkhoff, the capital of Little Russia, in the evening, he stayed 2 days and, having been furnished with a letter of introduction to a French resident, from one of his Riazan friends, he was pleasantly entertained.

He resumed his journey on the 26th September with a new escort, who spoke English and French, both badly. From Belgorod to Kharkhoff he had been on the road by which he had travelled up country, but now again diverged, taking the road to Poltava which was reached on the 27th. Here he remained for 10 days and made the acquaintance of an old Russian officer, named Scott, who was Captain of the Cadet Corps. His father was a Scotsman who had become a naturalized Russian, and he himself was a veteran who had seen much service in the Wars with Turkey in 1829–9, with Poland in 1831, and with Hungary in 1849. From this officer he received much kind attention.

On the 7th October he left Poltava for Odessa. His escort owned a very comfortable tarantasse, in which they travelled. This tchinovnik was an educated man and a very agreeable companion. The five days occupied in the journey were among the most pleasant James had enjoyed in his long travel. Odessa was reached on the 12th. The last stage followed the coast and he saw the allied fleets of some 80 sail in the offing. He spent a week at Odessa with some other French and English officers who were prisoners. The Russians were expecting a bombardment of the town and the prisoners were confined to the house where they lived, and at night were locked in and watched by sentries. The Allies had, however, no intention of bombarding Odessa, but hoped by a naval demonstration to draw off the attention of the Russians from Kinbourn, which they at this time successfully attacked, and the defences were destroyed.

On the 20th October with the other English prisoners James was marched down to the harbour, where the parties embarked in small boats which took them to the transport *Columbo*, a fine P. & O. steamer, commanded by Capt. Methuen. James was at last a free man again. Nearly four months of captivity, whatever its hardships, had enabled him to see a great deal of Russia. He had driven some 1,900 miles through the country, and had studied the people and their manners and customs, much to his own enjoyment and edification.

The *Columbo* carried the exchanged prisoners to the fleet which had gone to Kinbourn. James went on board the flagship, and

Digitized by Google

reported the arrival of the detachment of prisoners to Admiral Lyons. He found his cousin Tom Fellowes was a lieutenant of the ship and he stayed the night with him. The detachment of ex-prisoners was transferred to H.M.S. *Agamemnon*, Capt. Sir T. Pasley, and sailed for Kazatch, arriving there on the 25th. Here James found the *Megæra* lying, and his brother delighted and much surprised to see him, as he had heard nothing of him since his capture.

Next day James reported himself to the Commander-in-Chief, General Sir James Simpson. He found that Colonel Lloyd was in command of the Royal Engineers, and that several officers of the Corps had arrived while he had been away:—Cooke, Schaw, Ranken, Nicholson, Scratchley, Kelsall, Cumberland, Edwards, and Dumaresq.

Sebastopol had fallen, and the Engineers were employed in the demolition of the forts, barracks and docks on the south side of the harbour; in making a careful survey of the positions occupied by the Allied Armies; and in erecting huts, improving roads, etc. As James scarcely possessed any clothing and no equipment, and was still in weak health, he was given five weeks' leave to go to Malta to refit; he left the Crimea on the 31st October in the *Alice Jackson* and arrived at Constantinople on the 2nd November. Finding the transport *Emperor* on the point of sailing for England he obtained a passage in her to Malta without difficulty.

Three of his brother officers were in the ship on passage to England, Major Stanton, and Lieuts. Elphinstone and Sedley. The latter two had been wounded on the 8th September. Elphinstone, then a subaltern, was given the V.C. for his gallantry on that day. James says of him:—

> "I remember him as one of the most fascinating men I ever knew, and I have no doubt his agreeable manner and his brilliant linguistic skill, aided by the large store of information he possessed on every subject, pointed him out as a fit man for appointment as Governor to H.R.H. the Duke of Edinburgh."

At Malta James was welcomed with the greatest kindness by his old chief, Colonel Ringler Thomson, the Commanding Royal Engineer, and gladly accepted his invitation to make his house his quarter during his stay in Malta. He had an equally kind invitation to stay at the Palace from his relative the Governor, Sir William Reid, but he had already installed himself with the Thomsons and preferred the less public life he could lead there. He mentions, as a trait of Sir William Reid, the wonderful tact and delicacy with which he did little kindnesses. He says he will never forget, in his own case, how he provided him with a sum of money, of which he was

Digitized by Google

very much in need, and did it in such a way that his feelings could not be hurt. He goes on to say :

"Nothing could have been more acceptable than his gift, for my pay had been stopped during my captivity in Russia, and while I was under the necessity of providing myself with an entirely new outfit, I had little or nothing at my bankers, and should have had to borrow, if it had not been for the great kindness of Sir William Reid. At the time I was not aware that my friends in England had placed money to my credit, so on the whole I was much better off than I had reason to expect."

After a very enjoyable few weeks in Malta, James returned to the Crimea, where he arrived the day after Christmas, and rejoined the 1st Company of Royal Sappers and Miners, then under command of Capt. De Moleyns. Shortly after his arrival he was detailed for surveying duties under Lieut.-Colonel Cooke, R.E., and during the next few months assisted in making the map of the attacks and positions of the Allies on the heights of Sebastopol. His portion of the work was the ground near Kamiesch and Kazatch, and the defensive lines erected by the French in front of those places. The map was drawn on a scale of 6″ to the mile. James says :

"I cannot remember the names of most of the officers who assisted in the survey, but one of them, Lieut. John Grinlinton of the 4th Regiment, an old Survey Sapper promoted from the ranks, occupied a section of the hut I was in. This officer, with whom I became intimate, soon retired from the Army and went to Ceylon, where, after holding important government appointments, he was knighted and is now living in retirement in England. He was one of the best specimens of the large number of our Sapper non-commissioned officers who were rewarded with commissions after the siege as quartermasters, etc. . . . Grinlinton was a perfect gentleman in his manner and I derived great pleasure from his society as long as I was in intimate daily communication with him.

"By placing two large huts together we established a mess building in the Engineer camp, which was much envied by the rest of the Army on the heights in the winter of 1855-6. We lived well, though our cook may not have been a great artist, but our haggises, made by a Scots sapper, were a great attraction to the hungry officers of the infantry regiments round us. Constant out-of-door work gave us the most ravenous appetites, and the roughness of our food was a matter of indifference. After all it was ten times better than it had been during the long weary time of the siege. Our mess table, made from old teak gun-platforms, is now preserved in the Model Room at Chatham. . . .

"In destroying the naval barracks in the Karabelnaia suburb a sad fatality happened in the death of Major Ranken, R.E., who was buried in the ruins of the building as it fell. At that time military mines were

Digitized by Google

fired by a train of powder hose, the explosion being made by a piece of Bickford fuze, cut of a length to give time to the man lighting it to get to a safe distance before the charge blew up. Ranken lighted the fuze himself and retired. Such a long time elapsed without an explosion that he thought there had been a failure, and advanced to examine the cause. But the fuze had only smouldered, and when he disturbed it, an immediate explosion took place. His body was so deeply covered with the *débris* that it could not be extricated for 24 hours, but its condition when found proved that death must have been instantaneous. I hardly knew Major Ranken myself, but he was a man very much liked and esteemed, and his death coming alone after the period of the greatest peril was overpast, seemed to affect the whole camp almost more than the constant daily losses had done at the height of the siege." [James commanded the party which extricated the body of poor Ranken].

When peace was within sight, and an armistice had been arranged, James obtained a few days' leave of absence, and in company with Capt. Gronow-Davis, R. Artillery, afterwards V.C., made a very pleasant and interesting trip through the Crimea, of which he gives an account in his MS. book. Having finished his survey work with credit he rejoined his company at Balaklava, but not for long, for peace was declared in May, 1856. He was thinking only of returning to England, when he heard of an opening for employment in the East, which took him away for military duty for a time. Peace came and the troops embarked for England, but James did not accompany them. As the war was over and it will not be necessary to refer to it again, it may be as well to state here that for his services in the Crimea James received the Queen's War Medal, the Turkish War Medal, and the 5th Class of the Turkish Order of the Medjidieh.

(*To be continued*).

Digitized by Google

TRANSCRIPTS.

THE FORTIFIED POSITION OF NAN SHAN AND THE KUROPATKIN REDOUBT.

By MAJOR DON AUGUSTIN SCANDELLA.*

(Translated from the *Memorial de Ingenieros*, January, 1910).

Two episodes of the Russo-Japanese War, in which fortification played a very important part, will serve as the theme of the present memoir. Both took place in the Kuan-tung Peninsula and were responsible for numerous losses in the ranks of the belligerents. Both deserve to be studied closely, for they present such antithetic characters that, if they were considered as isolated examples, they would give rise to opposite and erroneous deductions regarding the application of field fortification.

Without going into details, it is easy to present the Isthmus of Kin-cho as a model of a perfectly fortified zone, provided with powerful artillery, endowed with great defensive strength, and garrisoned by brave Russian soldiers; in spite of which the Japanese after a few short hours of fighting succeeded in planting the banner of the Rising Sun on the crests of the Nan Shan. There may be some who would draw as a consequence of this action the lesson that fortification exercises an insignificant influence on the results of battles. On the other hand we would fall into an equal error if we were to say definitely that a simple fort, such as the celebrated Kuropatkin Redoubt, was sufficient in itself to detain for a month the advance of a besieging army, which, provided with powerful means of offence, required to deliver a step-by-step attack in order to gain possession of it. Both incidents have taken place in the way above described, but it will be well to note other factors which may aid the reader in forming his opinion on these two events of a war, in which the art of the engineer, in all its branches, has had such an extraordinary application.

I. THE FORTIFIED POSITION OF NAN SHAN.

Geographical Sketch.—The walled city of Kin-cho has given its name to the isthmus which connects Southern Manchuria with the Kuan-tung Peninsula, in which Port Arthur and Dalni are situated. Its eastern shores are bathed by the waters of the wide Bay of Ta-lien, while the western coast, marshy and extensive, forms a part of the Bay of Kin-cho. In the centre of this tongue of land there rise the hills of Nan Shan, where the events took place, which we are about to narrate. The railway which runs from Harbin to Port Arthur sends out a branch, to the south of the Nan Shan, at Ta-fan-chen, which leads to the small port of

* Major Scandella of the Engineers was Spanish Military Attaché with the Japanese Forces in Manchuria, and is now a professor at the Staff College, Madrid.

Digitized by Google

Liu-chu-tun; and as soon as the Nan-kuan Mounts are passed, there is a second branch which connects the beautiful city of Dalni with the main line.

The heights of Ho-chang-to to the south of Liu-chu-tun form a good observing station from whence to enfilade the entrance of Ta-lien Wan. The deepest soundings in this excellent bay are in the Odin Cove, and the shallowest in Hand Bay. The port of Dalni is well protected against the prevailing winds. The San-shan Islands bound the three channels which lead to Ta-lien Bay.

Navigation is not impeded by ice in the waters which surround the Kuan-tung Peninsula.

The hills of the Nan Shan are rocky and without vegetation. A cultivated plain lies between them and the mountains which surround Kin-cho on the north and east.

In this sketch and in *Plate* I., taken from the Japanese chart, everything has been omitted which has no immediate relation with the present study.

Fortifications of Nan Shan.—Plans of the hills and fortifications of the Nan Shan were made by the engineers of the IInd Japanese Army, after the position was captured. One copy of the general plan, and another showing the plans and sections of the forts situated on the left flank of the Russians were presented to each of the foreign Military Attachés by Marshal Yamagata, and the reader will find them reproduced in Capt. Giannitrapani's book *La Guerra Russo-Giapponese.* In this work no definite details are given of the fortifications on the left flank. Lieut.-Colonel Schwarz, who has a great knowledge of the ground and of the works constructed and projected, published in Nos. 1 and 2 of the *Russian Engineer Journal*, 1906, an article which serves to complete the information given by the Japanese. Lastly General Hamilton, in his notable work *A Staff Officer's Scrap Book*, presents two good panoramic views, the one of the hills of Nan Shan seen from the walls of Kin-cho, and the other of the field of battle seen from one of the Nan Shan Hills. So as not to increase unduly the topographical part of this study we only reproduce the original Japanese general plan of the Nan Shan position (*Plate* II.) and the accompanying plans and sections of Batteries 8, 9, and 12.

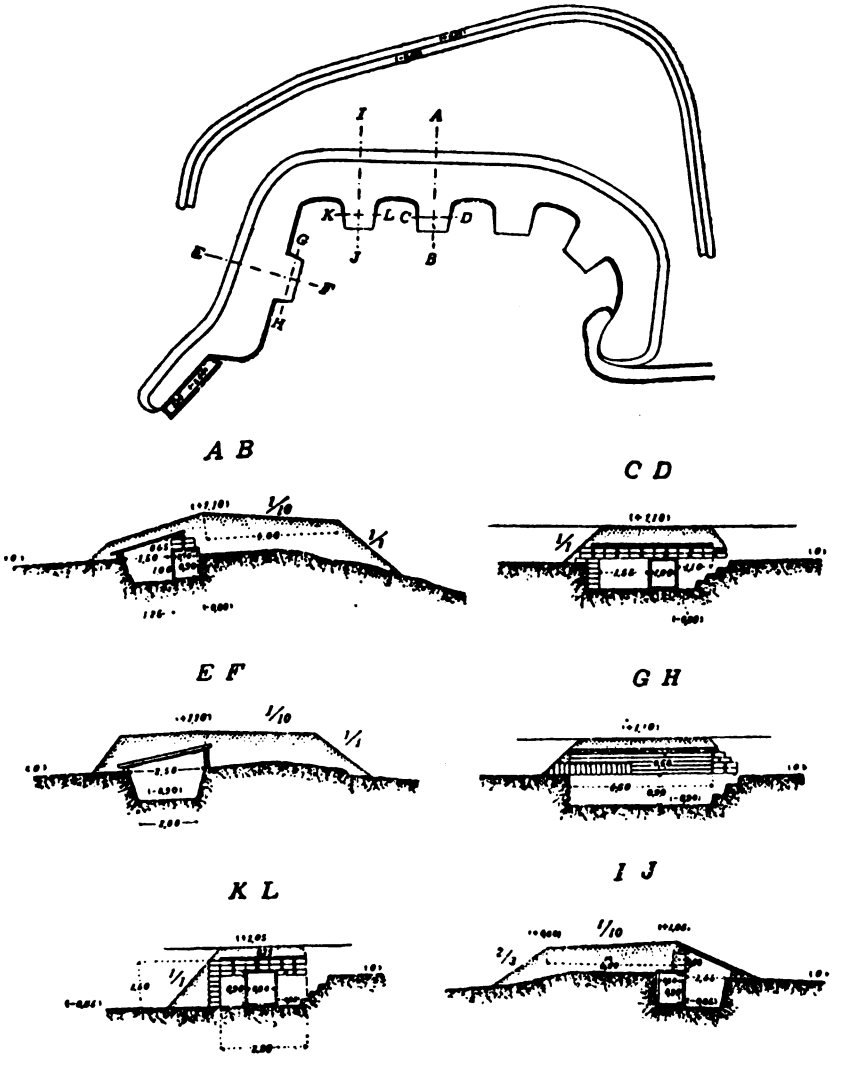
The proceedings followed by the representatives of the Tsar in regard to the defence of the Isthmus of Kin-cho, are a reproduction of those usually adopted by those nations who are badly organized in a military sense, and who do not preoccupy themselves with the possibility of international conflicts until the moment when hostilities break out. It should be observed that the recent war has given us one more example, in spite of the theories of international jurists, of the fact that a declaration of war often follows instead of precedes the outbreak of hostilities.

We will now consider in broad outline the instructive process of the defence of the Isthmus of Kin-cho during the short period of six years.

When in 1898 the Liao-tung Peninsula was ceded by China to Russia, the troops of the Tsar occupied the city of Kin-cho. A few months

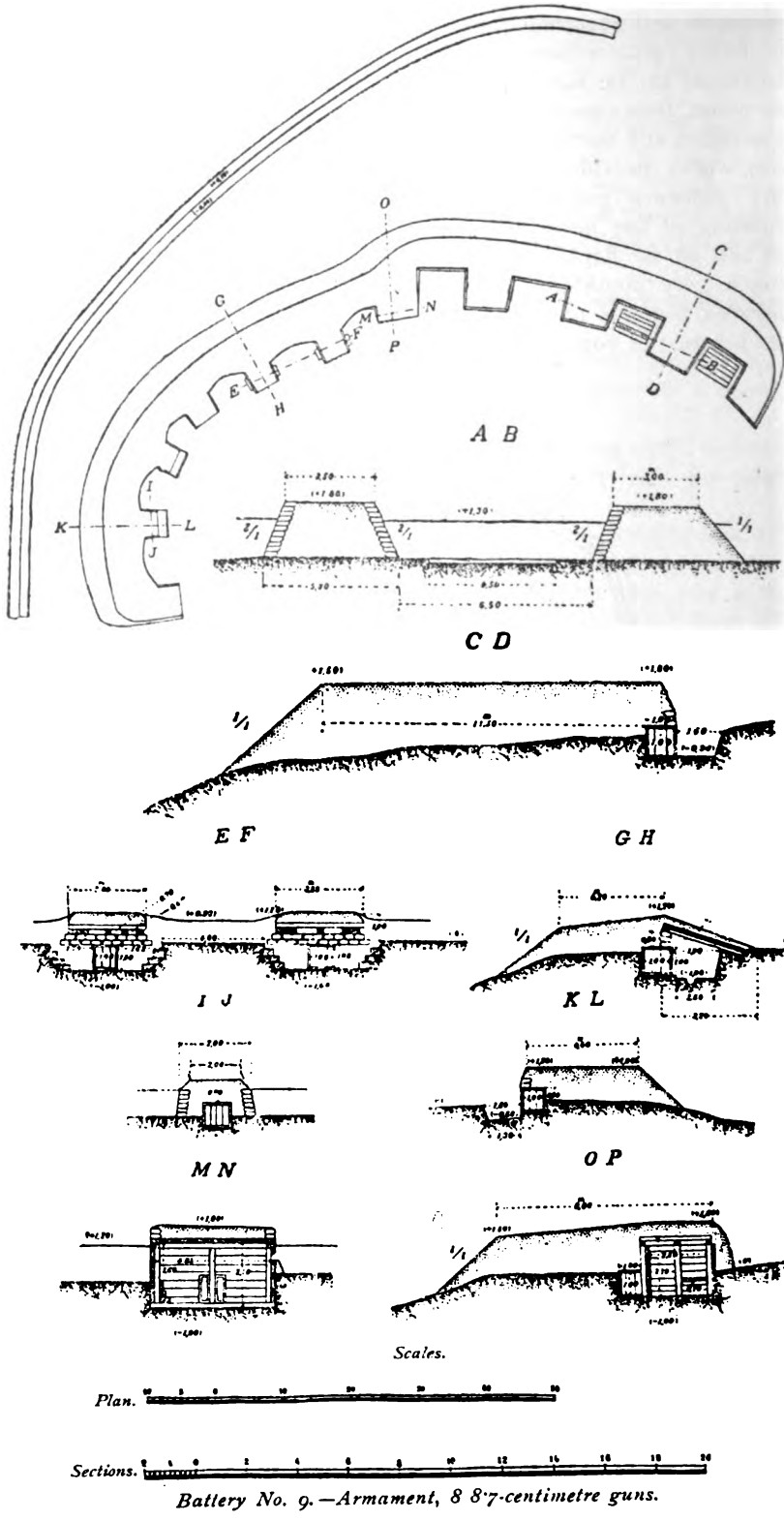
Digitized by Google

afterwards self-government was given to this place. In 1900, owing to the Boxer insurrection, the Russians commenced to give military importance to the Kin-cho Isthmus; and after reoccupying the city of that name, they constructed two redoubts on the Nan Shan, as well as 12 batteries and numerous trenches, all of a field type. There were only three works provided with shelters. In the spring of 1903 Engineer Capt. Schwarz made a project for the defence of the position, consisting of five permanent forts, three on the crest of the Nan Shan and two on the flanks, united by means of a trench and ditch, so as to form a very considerable obstacle to an attack. This project was approved, but was not carried out. On the 3rd February, 1904, a few days before the commencement of the war, General Kondratenko, with



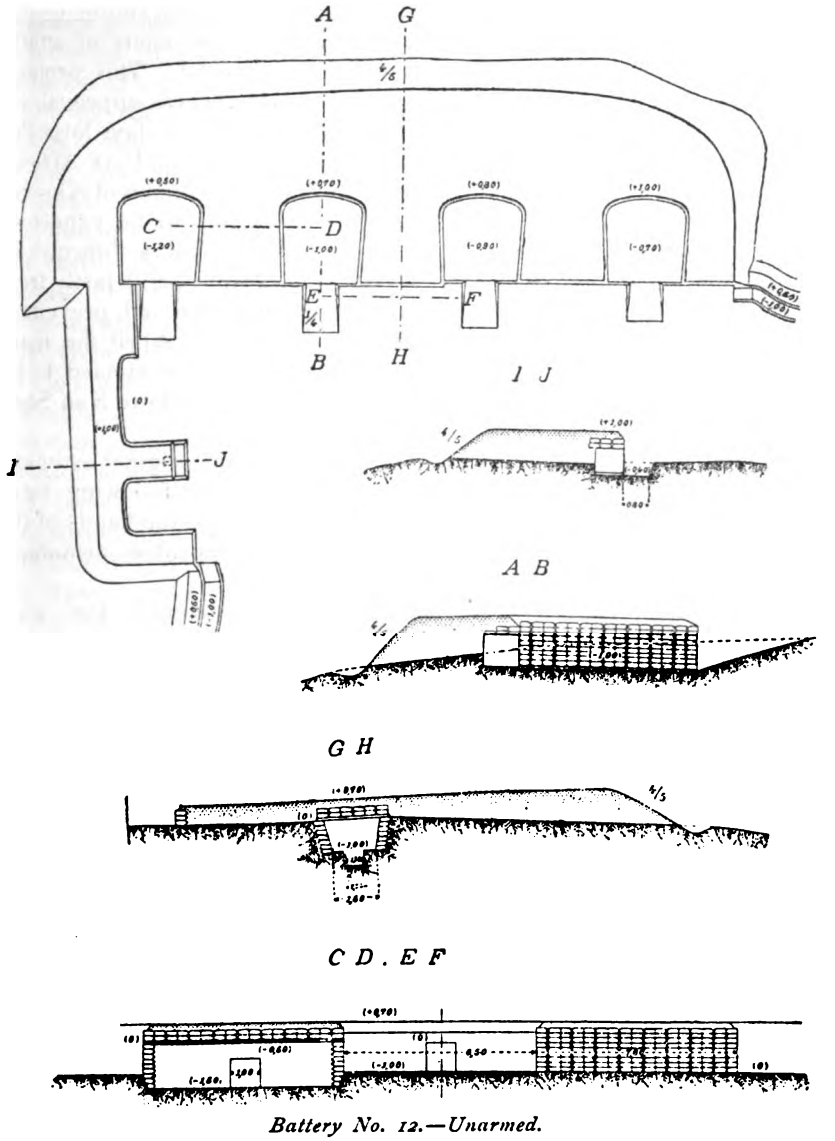
Battery No. 8.—Armament, 4 8·7-centimetre guns.

Digitized by Google



Battery No. 9.—Armament, 8 8·7-centimetre guns.

Digitized by Google



Battery No. 12.—Unarmed.

Colonel Tretiakov, commanding the 5th Siberian Rifles, and Capt. Schwarz reconnoitred the position and presented another project, the estimate for which amounted to £2,000, and in which it was proposed, amongst other things, to reconstruct all the works made in 1900, as they were in a very bad state owing to their not having been kept in repair for four years; to construct numerous blindages; to improve the roads; to facilitate communication by establishing a telephone service to connect the batteries with each other, and with Dalni, Port Arthur and Kerr and Ta-lien Bays; to concentrate the defence of the position on its summit and to extend it towards the north; to organize the south front in

Digitized by Google

view of a possible hostile disembarkation on the southern shores of the isthmus; and lastly it was considered that the probable points of attack would be the right flank and a part of the north front. This project, which was presented on the 6th February did not receive approval, on account of the estimate being considered excessive. Two days later the Japanese torpedo boats attacked the Russian squadron in Port Arthur. As a consequence of this attack the defence works on the isthmus of Kin-cho were commenced on the 18th February, and, as was to be expected, the Russians had to contend with a dearth of workmen, a difficulty in getting sufficient tools and materials, lack of transport, and lastly frost and snow which, combined with the rocky nature of the soil, prevented the rapid execution of the works. At the beginning of April the main lines of the defence were organized; but all the works continued to be improved up to the 26th May, 1904, on which day the Battle of Nan Shan took place.

The total cost amounted to £6,000, or three times the original estimate.

Regarding the armament of the fortified zone, the following table shows the number and nature of the guns which fell into the hands of the Japanese on the 26th May. In addition, the movable armament consisted of 6 field batteries and 10 machine guns.

The Japanese captured in the emplacements named the guns enumerated in the following official return:—

In the fortress of Kin-cho.		2	guns	of 7·5 centimetres	(field).	
		2	,,	,, 8·7	,,	
In the batteries.	No. 1 ...	8	,,	,, 8·7	,,	
	No. 2 ...	4	,,	,, 8·7	,,	fortress mountings.
	No. 3 ...	4	,,	,, 10·5	,,	
	No. 4 ...	1	,,	,, 15·0	,,	
	No. 5 ...	2	,,	,, 8·7	,,	fortress mountings.
	No. 6 ...	4	,,	,, 15·0	,,	
		4	mortars	,, 15·0	,,	
	No. 7 ...	4	guns	,, 8·7	,,	(field).
	No. 8 ...	4	,,	,, 8·7	,,	
	No. 9 ...	4	,,	,, 8·7	,,	
		4	,,	,, 8·7	,,	fortress mountings.
	No. 10 ...	6	,,	,, 8·7	,,	
		2	,,	,, 8·7	,,	(field).
	Nos. 11 & 12	No armament.				
	No. 13 ...	2	guns	of 8·7 centimetres	(field).	
	No. 14 ...	2	,,	,, 8·7	,,	fortress mountings.
To the south of Nan Shan		5	,,	,, 15·0	,,	without carriages.
		2	,,	,, 12·0	,,	
On Nan-kuan Ling ...		4	,,	,, 8·7	,,	(field).
In the permanent batteries of Ho-chang-to, to the east of Liu-chu-tun.		2	,,	,, 15·0	,,	
		2	,,	,, 10·5	,,	
Total		74				

Digitized by Google

Battle of Nan Shan.—It is no part of our intention to enter upon a description of this well-known battle; we shall merely make a few remarks, so as to bring out its essential features.

On the 5th May, 1904, two days after the last attempt made by the Japanese fleet to block the entrance to Port Arthur, the disembarkation of the IInd Army under General Oku was commenced to the east of Pi-tse-wo. On the 25th the Japanese occupied the line Pi-tse-wo—Pu-lan-tien, so as to contain an offensive movement of the Russians from the north. At the proper time the 1st, 3rd and 4th Divisions and one brigade of artillery surrounded the town of Kin-cho, and extended from Lung-huang-miao (*Plate* I.) on the Bay of Kin-cho, to Huang-kia-tun on Kerr Bay. General Oku issued a General Order at 6 p.m. on the 25th for an attack on the town and on the position of Nan Shan. Preparations began at midnight, and at dawn on the 26th Kin-cho was captured. An advance was then made on Nan Shan, the 4th Division being on the right, the 1st Division in the centre, and the 3rd Division with the artillery brigade and two companies of the 5th Battalion of Engineers on the left. The bombardment commenced at 5.30 a.m., four Japanese gunboats in Kin-cho Bay taking an active part in it, and firing on the left flank of the Russians. At 11 a.m. the fire of all the Russian guns, mounted mostly *en barbette*, in the Nan Shan batteries was silenced. A Russian gunboat in Ta-lien Bay kept up a fire for four hours with effect on the left flank of the 3rd Division. The latter was very nearly overthrown by a counterstroke executed by the Russians from Ta-fang-chen under the protection of some Q.F. batteries which had retired early from their positions on Nan Shan to others on the heights of Nan-kuan Ling. Up to 5 p.m. all the Japanese attacks had been repulsed, and their artillery was running short of ammunition, when, almost at sunset, the gunboats in Kin-cho Bay redoubled their fire, and aided that of the 4th and 13th Artillery Regiments to the west of Kin-cho. This fire enabled the 4th Division to advance, and the men, wading up to their waists in water, succeeded in entering the trench, which starts from near Battery No. 8 (*Plate* II.) and runs down to Kin-cho Bay, and into the nullahs which exist between this battery and No. 10. The result was that the 4th Division captured first Fort No. 9, and then No. 8. The Russians then began to retreat, and the 1st and 3rd Divisions made a final attack. At 7.20 p.m. the Japanese flag was flying on the top of the Nan Shan. Two hours earlier the victors were on the point of considering themselves vanquished.

The following tables show the losses incurred and the amount of ammunition used by the attack:—

Losses of the 2nd Japanese Army at Nan Shan.

Units.	Officers.		Men.		
	Killed.	Wounded.	Killed.	Wounded.	Total.
1st Division	14	41	202	1102	1359
3rd „	6	32	161	1222	1421
4th „	8	38	298	1303	1647
Artillery Brigade—					
13th, 14th and 15th Regts.	—	5	15	43	63
2 Cos. 5th Bn. Engineers	1	—	5	8	14
Total	29	116	681	3678	4504

Digitized by Google

The Japanese buried on the battlefield the corpses of 10 Russian officers and 664 men. The number of prisoners was 23.

Consumption of Ammunition, 2nd Japanese Army, at Nan Shan.

Units.	Common Shell.	Shrapnel.	S.A.A.
1st Division	450	6015	667000
3rd „	462	3249	425148
4th „	806	5000	1110886
Artillery Brigade	2029	16036	—
Total	3747	30300	2202934

CONSIDERATIONS.

(A). The inspection of the battlefield and the study of the means with which the Russians and Japanese fought, has given rise to conflicting opinions regarding the wisdom of the choice of Nan Shan as a defensive position.

It is argued that the Russians should never have massed the whole of their defensive forces in a zone of such small dimensions; and that as numerous guns, redoubts, trenches, entanglements, mines, projectors, telephones, barracks, etc., had been placed within a square of less than 2 miles side, the problem which the attack had to solve in order to demoralize the garrison was simply that of distributing its artillery in such a way as to convert this square into a "common depository" for all its projectiles. This is what the Japanese did, as they directed on it simultaneously from the north and south flanks a concentric fire which soon overpowered the hostile artillery. If the Russians, in place of choosing the position on the Nan Shan, had defended and fortified that of Nan-kuan Ling, 2 miles further to the south, matters would have taken quite a different turn. This position extends from north west to south east, has a greater elevation than the Nan Shan, forms a barrier almost normal to the march of the invader, offers good emplacements for the Russian medium artillery, and from it counterstrokes, which could easily have been prepared, would have rendered the advance of the Japanese by the Isthmus of Kin-cho very difficult.

These are the chief arguments expressed in favour of the occupation of Nan-kuan Ling, and it is possible that military opinion may pronounce against Nan Shan, and attribute to the faulty choice of this position the defeat suffered by the Russians. In our humble opinion this choice was not so faulty as some persons pretend.

(*a*). The phrase "bottling up" of the Russian fleet in Port Arthur has been universally accepted, and we will permit ourselves to say that the Nan Shan was the cork of the bottle of the Kuan-tung Peninsula. It must be agreed that it could not be a matter of indifference to one of the belligerents whether this cork was or was not at the mercy of the other. Port Arthur was doubtless one of the objectives of Japan, and the Japanese used every endeavour to capture it; but once they were in possession of the Nan Shan, they could have contented themselves with blockading the peninsula, and have avoided the enormous losses which

Digitized by Google

they suffered in besieging the fortress. They might thus have massed stronger forces against General Kuropatkin's field army.

(*b*). The fact that the Russians had fortified and unsuccessfully defended the Nan Shan position, was no bar to their also defending the Nan-kuan Ling position; whilst, if their first intention had been merely to occupy the latter, *ipso facto* they must have abandoned the former.

(*c*). From Nan Shan the permanent batteries of Ho-chang-to are taken completely in reverse; besides this, the entrances and a part of Ta-lien Bay, namely that close to Odin Cove where ships of large tonnage can lie, are enfiladed from the same position.

(*d*). The foreshore of the Nan Shan on Kin-cho Bay is very low and very extensive. On the other hand where the western spurs of the Nan-kuan Ling enter the sea, there are soundings of 2 or 3 fathoms close inshore, so that vessels of considerable draught can enfilade a good part of this position much more easily than they can the Nan Shan position. The help given by the navy to the army on the 26th May was not confined to the bombardment of Nan Shan, but included also that of the Nan-kuan Ling. The gunboats *Akagi* and *Chokai*, both of 620 tons, and four torpedo boats, approached the coast as closely as possible so as to assist the advance of the troops across the isthmus, whilst the gunboats *Tsukushi* (1,372 tons) and *Keuyen* (2,165 tons) could only intervene in the last part of the engagement, and then but indirectly, as they were prevented by their greater draught from coming in closer.

(*e*). As a consequence of (*c*) it may be inferred that when the Nan Shan was captured by the Japanese, Liu-chu-tun and the whole of Dalni Bay was virtually in their hands.

(*f*). The Russians ought not to have abandoned a position with such an open field of fire towards the north and east as was possessed by the Nan Shan. The width of this field of fire explains how it was that successive and vigorous attacks made by the Japanese during 12 hours, could be held back by the musketry fire of the defence. The fire of the artillery posted on the Nan Shan was silenced, as has been said, shortly after the commencement of the bombardment.

Naturally this argument will not be accepted by those who maintain that in spite of the progress made in the construction of firearms, the defence of a position should be organized in depth, and that a field of fire of 200 or 300 yards is sufficient for the main line of defence.

(B). Other criticisms directed against the Russians consist in stating that the choice of a defensive position of which the flanks rested on the sea was inexplicable.

The progress of these fortifications, mentioned above, explains this mistake: and the following extract, copied from the Memoirs of General Kuropatkin, exonerates the author of the scheme of defence:—" . . . the following principles were adopted as the bases of our plan of operations:—Firstly, the relation between the Russian and Japanese naval forces in the Far East is such, that the possibility of the defeat of our fleet cannot be admitted: and secondly, the disembarkation of the Japanese at Yinkow or in the Bay of Korea may be considered impracticable." Experience soon showed, only three months after the commence-

Digitized by Google

ment of the war, what a great error had been committed by the Russian Commander-in-Chief in expressing these principles.

(C). The Nan Shan position was, in our opinion, well chosen; it was, to all appearance, fortified and armed in a formidable manner; and was, by all accounts, bravely defended by the Russians; but in spite of this, the 2nd Japanese Army captured it after a one-day battle, without constructing any preparatory works, and even without the assistance of field defences, which would have given cover to the assaulting columns. We will now endeavour to make clear the reasons for our opinion.

It is sufficient to glance at the map of the fortifications of Nan Shan to notice that the Russians had massed their defences on their right flank. Two, three and sometimes four lines of accessory defences were arranged in front of the echeloned trenches, amongst which were placed four machine-gun emplacements and seven batteries, armed with 30 guns and mortars. On the left flank, where the heights are less than on the right, there were not many accessory defences, the length of trench is less, and some of the trenches themselves are normal to the coast, as if it had been thought that Kin-cho Bay was inaccessible and that consequently there was no possibility of their being enfiladed. Besides this, Forts Nos. 11 and 12 were unarmed, and as regards Nos. 8, 9 and 10, it is to be observed that the four guns in No. 8 fired towards the north, and the eight in No. 10 fired through embrasures towards the north east. In the same way only four guns of the eight in No. 9 Battery could be readily fired in the direction of Kin-cho Bay. Lastly it must be observed that the profile of all the works indicates that in the opinion of the author of the scheme of defence less thickness need be given to the parapets of the left flanks of the works, presumably because no attack need be expected from the west.

Putting aside the greater or lesser value of the combatants at Nan Shan, it must be remembered that fortifications do not defend themselves, as a passive defence must be absolutely condemned. The Russians, however, made only one counter-attack on their right, and neither official nor private accounts of the battle make any mention of a counterstroke on the left flank, which, besides being inadequately fortified, had to bear the attack of the invaders, who were helped by the flanking fire of their gunboats. The repeated onslaughts of the Japanese against the north and east fronts were repulsed one after the other, and the Nan Shan position fell into their hands when they had concentrated the fire of their land and sea guns against the weak spot on the Russian left, and had supported the artillery by the gallant assault of the 4th Division.

(D). The strength of the Japanese was 32,000 men with 180 Arisaka field guns (7·5 c.m.); the Russians numbered 16,000 men with the artillery enumerated above; but as G. H. Nojin states in his book *The Truth about Port Arthur*, only a small part of these 16,000 men fought at Nan Shan, the defence of which was confided to the 5th Regiment, which sacrificed itself, whilst the remainder of the defenders under the orders of General Fock stayed under the shelter of the Nan-kuan Hills.

General Langlois says " . . . the position is a secondary factor, the strength resides in the troops." Lord Roberts in treating of the defence of a position, explains what are the proportions in which the total dispos-

Digitized by Google

able force should be distributed between the two principal groups: the one detailed to occupy and defend the trenches, the other to form the general reserve, and adds " . . . we must not forget that the stronger the reserve, the greater will be the probabilities of success."

General Fock took this last principle into consideration, and organized a strong general reserve; but he forgot entirely that the principal strength of a position resides in the troops. The defence was conducted in an exaggeratedly passive manner.

(E). We have already stated, when speaking of the Russian left flank, that the fortifications of Nan Shan were defective. When we went over the ground we took the opportunity of considering the system of defence, which was afterwards reproduced on other sites, and which consisted in placing the batteries on the crests of the hills, each gun in a separate pit or behind a parapet, and below the guns one, two or three lines of trench normal to the probable direction of the attack. That is to say, the vulnerable zone for the Japanese shots, whether long or short, was perfectly well marked, as it was enclosed between the crest of the hill and the trench at the lower level. In confirmation of this view, it will be seen from *Plate* II. how many works and trenches fall within the line of fire of a gun placed east of Liu-kia-tung and firing against Battery No. 6. It will thus be understood how it was that almost all the Japanese shell produced a useful effect, and that a few hours after the commencement of the bombardment, the Russian artillery, mounted *en barbette*, was put out of action, probably by the disablement of the gunners, as the victors captured in every case a good supply of ammunition and found the guns in their respective emplacements, generally speaking in good condition.

We have been unable to explain what induced the Russians to place four 6″ mortars in No. 6 Battery, on one of the highest points of the position, with a command of 288′, when they could easily have found a less visible site for them.

(F). The effect of the Japanese field artillery, although use was made of common shell filled with Shimoze powder, was small against the fortifications, and of no effect against the wire entanglements.

The troops of the IInd Army, in this their first battle, almost entirely neglected the use of field fortification; but the growing importance which was afterwards given to this means of defence, was most marked as they advanced northwards against the troops of General Kuropatkin.

In this connection we will mention a detail which is of some interest. As is known, the Arisaka gun was not provided with a shield. In the first battles the gunners confined themselves to making small parapets to the right and left of the gun for the purpose of protecting the gun numbers. Soon afterwards the use of gunpits became the custom; still later wooden shields were constructed in the theatre of war for the field guns, and were afterwards replaced by metal ones, sent from Japan. Finally at the Sha Ho guns were sited in provisional casemates. All this shows that the Japanese, who were always on the offensive, endeavoured to cover themselves from the enemy's fire, in such a way as not to hinder their making full use of their arms, and for this purpose

Digitized by Google

they took advantage of the ground, of shields, sandbags, etc., that is to say of field fortification in its various aspects.

Summary.—In concluding the first part of this study, we will make the following brief summary:—

(1). The Russians were right in fortifying and defending the Nan Shan position.

(2). The works attacked by the Japanese, though sufficiently complete in their details, were far from perfect in their general organization.

(3). The scheme of permanent forts drawn up by the Engineer Schwarz would perhaps have been a preferable solution.

(4). The principal cause of the defeat of the Russians was the passivity of their defence. The limited use of their mobility and of that reserve which, according to Lord Roberts, is the bearer of success, was fully apparent.

(5). When the Nan Shan had been lost, the Russians should not have retired, abandoning Dalni and Ta-lien Wan, but should have defended the Nan-kuan Ling.

(6). The use of field fortification is as necessary for the attack as for the defence.

'M.'

Digitized by Google

TRAVELLING IN THE AIR.

By Col. J. E. Capper.

Now that travelling in the air by means of dirigible balloons and aeroplanes must be looked on as an ordinary procedure in war, and as likely to be greatly developed for peaceful purposes, the accompanying paper on "Map Making by Balloon Photography," communicated to me by Capt. Scheimpflug of the Austrian Army is likely to prove of interest to R.E. officers.

There seems to be every reason to believe that the exceedingly ingenious apparatus he has evolved will be of the greatest assistance in enabling correct plans of defensive works, etc., to be rapidly obtained and entered on existing maps for military reconnaissance, and that, in the absence of accurate maps, his method of map making by photography from dirigible balloons will be of great value for the reconnaissance of country in war, or for exploration work and check surveys in peace.

For military reconnaissance, where finished contour maps should not be necessary plastic views giving stereoscopic effect in a special stereoscope can be quickly evolved—and require a comparatively small equipment of instruments.

J. E. Capper.

Scheimpflug's Balloon Apparatus

consists of a central camera which at the moment of exposure points vertically downwards, and of a ring of inclined cameras fixed around the central one in such a way as to take oblique photographs in all directions towards the horizon, slightly overlapping one another and the central photo.

All these cameras are photogrametrically adjusted; that is, they are provided with reference marks, and the focal distance of each objective, and the angles between all the optical axes are accurately ascertained.

A well-built and adjusted apparatus of this description for balloon purposes is an instrument which is capable of measuring angles to within 15 to 20 seconds of arc. With photographs taken from a height of 3,000′ to 6,000′, this means an error of only 4″ to 8″ in the location of landmarks—ordinary surveys can never attain such accuracy in every detail.

The shutters of all the cameras work by one common mechanism, and can be operated either pneumatically or by electricity, the latter being necessary where the camera alone is sent up.

Provision is made for a rapid levelling of the apparatus at the moment of exposure—except in the case of captive balloons or kites, where violent oscillations frequently interfere.

Digitized by Google

When required, such balloon apparatus can be constructed with levels and a small compass, which are automatically photographed on the plates and thus indicate the inclination and direction of every exposure.

The present apparatus is built for glass plates; they ensure irreproachable results, but in comparison with roll films have the disadvantages of greater weight and slower manipulation in changing. Scheimpflug recently conceived an idea which he hopes will help him counteract the influences of possible distortions in films. The use of films would materially increase the number of views that can be taken during each ascent.

As now constructed the apparatus, when carefully levelled, photographs a circular area the diameter of which is about equal to five times the height of the camera above the grouud, that is, about 2 square miles from a height of 1,500′, 8 square miles from 3,000′, 32 square miles from 6,000′, 128 square miles from 9,000′.

In practice, the apparatus has fulfilled the highest expectations: on three ascents Scheimpflug obtained about 75 views without the slightest hitch; all the photographs were faultless except four panoramas, where the plates proved imperfect. Scheimpflug therefore has given practical proofs that the opinion frequently expressed, viz.: that balloon photography presents excessive difficulties, is incorrect.

SCHEIMPFLUG'S PHOTO-PERSPECTOGRAPH.

This instrument transforms perspective views by photography, and consists in the main of a photographic objective between two plate carriers, with the necessary accessories for photographic reproduction. The plate carriers are not restricted to positions which keep the plates perpendicular to the optical axis, as for ordinary reproductions; the carrier can be set at any angle, and the plates can be made to slide or revolve in their planes. Scheimpflug discovered the laws that govern the relative position of plates and objective for any angle and scale required in the transformation.

His first model was constructed for reducing the oblique photographs obtained by the lateral cameras of his balloon apparatus to the plane of the central photograph. As the optical axes of the lateral cameras all form a permanent angle with that of the central one, it was possible to fix the plate carriers at a permanent angle also; the apparatus is therefore comparatively simple, and very rigid. In Model II. only one plate holder is fixed, the other is movable; this allows of a transformation at different angles or to different scales, but not both together in any desired combination. Model II. proves particularly useful for various industrial purposes.

In Model III. both plate holders are movable, and thus transformations as to angle and as to scale can be performed at one setting.

Where the angle of the required transformation and its scale are known, the setting can be calculated and effected, as the apparatus is provided with the necessary linear and circular divisions and indices.

Digitized by Google

But, in balloon photographs this angle is usually known only approximately, and there are other practical difficulties when it becomes necessary to transform a balloon view in such a way that it agrees with a given skeleton map. For this purpose an automatic focussing appliance is essential, in addition to the interdependence of the plate holders, which exists already in Model III.

Several years' experiments and a new, still unpublished idea, the product of Scheimpflug and Kammerer's joint studies, led to the construction of an instrument of precision fulfilling all the requirements in balloon photogrametry. While Model III. still requires two differential operations for transformation at *small* angles, the latest construction can transform at angles from 57° down to 0°; in addition it focusses the plates automatically and can resolve compound distortions. Different sizes of plates can be used, and the shapes of the reproductions, as well as their scale, can be adjusted at will. With an instrument of this kind one can either determine, from the readings on the divisions, the orientation of a view (by "optical coincidence" *i.e.* by adapting a transformation to a given skeleton map), or inversely, effect the required setting on the divisions for the given orientation of a view. The object of these operations is explained in the following.

Scheimpflug's Process of Balloon Photogrametry.

The utilization of balloon photographs for military reconnoitring and for the verification of existing maps has been frequently attempted, and there are already the beginnings of a technique in this direction, but the endeavour to utilize balloon photographs for actual map making encountered a variety of serious obstacles.

Firstly, the position from which the views are taken can rarely be ascertained with sufficient accuracy for geodetic purposes. Secondly, in most cases the balloon camera is but imperfectly levelled; the views are therefore distorted and their inclination is not known with sufficient accuracy. The prevalent geodetic methods, for determining the position and inclination of the views, fail, because the angle of vision of an ordinary camera is too small and the apparatus cannot be accurately adjusted. Even the best existing maps are not so precise that all landmarks can be implicitly depended upon; triangulation marks, which are reliable, are too sparse, and are frequently buried underground, so that they cannot be identified on the photograph; churches and chapels are almost the only objects available for orientation, but there are rarely as many as three (the required minimum) such points within the angle of vision.

These and other difficulties rendered a systematic use of balloon photographs for geodetic purposes impracticable. These difficulties are however got over by the little appreciated fact that the geometrical relations between a photograph and a good map of a flat tract of land are such as not to exclude the transformation of the photograph to a map, even where the position of the balloon and inclination of its camera are not accurately known, for, the photograph and the corresponding

Digitized by Google

portion of a map are perspective, and can be related to each other in accordance with the rules of projective geometry; with certain precautions this holds good even for other than flat regions. The transformation can, and has already been attempted by calculation and design, but this method is necessarily tedious and inaccurate. Scheimpflug considers himself entitled to lay claim to having been the first who tried to transform balloon views into actual maps by photography, and who created, theoretically and practically, the necessary instruments for this purpose.

The first task consisted in enlarging the field of vision of the balloon camera. This he accomplished by his balloon apparatus described above. From the fact that accuracy in the determination of geodetic positions by the prevailing methods increases approximately as the square of the field of vision, it becomes evident what advantages an angle of vision of about 140° affords compared with one of only 60°.

The deficiencies of balloon photographs due to inadequate adjustments of the camera were eliminated by the application of a new method for adjusting the balloon apparatus, which thus becomes as efficient as a theodolite, for measuring angles.

To make himself independent of maps—which are either not accurate enough or may not exist at all—Scheimpflug made experiments in two ways; on the one hand he invented and developed the method of "optical coincidence," which enables him to fit empirically the transformations of balloon views of unknown orientation upon existing maps and to determine thereby the inaccuracies of such maps as well as the orientation of the views; on the other hand, he succeeded in deriving a correct map from two balloon photographs of one and the same tract, but taken from different, though unknown positions. This latter method is particularly important for surveys of countries where no maps exist as yet.

Supposing now that the photographs are taken from a free balloon with a balloon apparatus as described above, and that the consecutive positions from which they are taken are chosen in such a way that the "panoramas" overlap one another well; further, that the apparatus was levelled approximately and that its remaining inclination can be determined from the images of the levels on the photographs, then the proceeding is as follows:—The photos are developed and diapositives made therefrom. The views taken by the outside circle of lenses are reduced to the plane and scale of the central one, by which they take the shape of trapeziums; these are then fitted around the central view, forming one "panorama." Up till now the plates had to be copied and the copies cut up and fitted together by hand, but a special appliance recently invented by Scheimpflug will enable him in future to do this joining most minutely.

The panoramas have then to be reduced to perfectly horizontal perspectives, either on the basis of the indications of the levels on the photographs or, where maps exist, by means of a photo-perspectograph, or by another new method thought out by Scheimpflug.

From panoramas thus accurately levelled a contour plan can be derived in various ways: either graphically or by calculation or by

Digitized by Google

means of a stereo-comparator. These contour plans serve for the reduction of the level panoramas to true vertical projections. In order to carry out this reduction Scheimpflug invented a "Zonal Transformer," based on the following observations:—In balloon views the images of points appear the further *outside* or *inside* their vertical projection, the *higher* or *lower* they are, and the further they are away from the plumb line through the position from which the view is taken. Contour areas above the mean level consequently appear larger, below the mean level smaller, than their true orthogonal projections. It is therefore only a question of reducing or enlarging the perspective projections of the successive areas in the ratio of their distances from the mean level, and with regard to the plumb line. The "Zonal Transformer" can do that photographically.

The orthogonal projections, reduced to the desired scale, can then be joined into maps bounded by meridians and parallels at right angles. There now only remains the names, altitudes, boundaries, etc., to be added. Important details can be accentuated and the contour zones toned off according to their heights; then the map is ready for reproduction by any of the approved methods.

In the case of photographs taken from captive balloons or kites, the readings on the levels, as photographed on the plates, are not reliable owing to sudden and violent oscillations; therefore the views must be located by geodetic methods dependent upon landmarks. Three points are requisite and sufficient for each panorama; they are determined orthogonally by triangulation, then marked on the focussing screen of the perspectograph in a perspective projection corresponding with the level bird's-eye view to be derived from the panorama, and with approximate data for the position of the balloon camera. The balloon view is then projected upon the focussing screen in that transformation which brings the images of the landmarks into precise coincidence with the identical marks on the screen. Now the divisions are read off from the perspectograph, and from these readings the position of the balloon and the inclination of the view are calculated. The transformed view is photographed and supplies the level perspective. From the scale of the markings on the focussing screen and from the inclination of the original view, calculated from the readings on the apparatus, the correct position of the balloon can be determined, from which in turn the horizontal projection, the contour plan, and the final map are derived.

Instead of expensive and slow triangulation, existing maps may be used for the transformation of a balloon view into a horizontal perspective, and for its orientation; insufficient accuracy in the required points is compensated for by the great number of available points: roads, paths, railways, etc., are especially valuable as they are usually very distinct on the views and accurate on the maps. In this case a photographic copy or, still better, a skeleton tracing of the map, omitting inessential details, like hatching, etc., reduced to the proper scale, is put on the focussing screen, and the balloon view is brought into the closest possible coincidence, so as to minimize small discrepancies and to eliminate gross errors in the map. The readings on the divisions of the

Digitized by Google

perspectograph supply the necessary data for the calculation of the position of the balloon and of the inclination of the view.

In coast surveys from ships, when triangulation is either impossible or impractical, the outline of the coast may be obtained by stereoscopic views taken with two apparatus, fore and aft, accurately adjusted in their relative positions. The coast line thus laid down can serve for the orientation of views taken by captive balloons or kites sent up from the ship. The subsequent procedure is as described above. This method offers particularly good chances of success because balloon photographs show details at a depth of 10′ to 15′ under water and thus may replace the tedious process of sounding in the ordinary way.

Digitized by Google

RECENT PUBLICATIONS OF MILITARY INTEREST.

JULY, 1910.

(*Published Quarterly*).

THE following extracts from the list compiled by the General Staff, War Office, are published in the *R.E. Journal* by permission of the Army Council.

*PART II.**

SECTION I.

AERIAL NAVIGATION.

AIRSHIPS OF THE WORLD, 1910 (Die internationalen Luftschiffe, 1910). By Capt. Neumann. 102 pp., with numerous illustrations. 8vo. Oldenburg, 1910. Gerhard Stelling. 4s. 6d.

The author is the Director of the new School of Aeronautics founded by the German Aeronautical Society at Friedrichshafen in October, 1909, and the information contained in the book concerning the details of construction of the airships of the various States up to February, 1910, may be taken as reliable. Aviation is not dealt with.

Many interesting details, hitherto not published, are given regarding German airships. The Parseval airships have received a nomenclature (A-G) according to the type of construction. A-II. and B-I., for instance, are the P-I. and P-III. owned by the State.

The following table shows, according to the author, the number of airships built, building and projected throughout the world :—

State.	Built.	Building.	Projected.	Total.
Germany	14	7	3	24
Belgium	1	1	—	2
England	1	1	2	4
France	5	1	3	9
Italy	2	2	—	4
Austria	1	1	2	4
Russia	1	1	—	2
United States	1	—	—	1

Readers are warned that pages 2 to 15 are not bound in chronological order and must not be confused when reading the accounts of the "Belgique II." and the "Parseval A-I.," the details of which are mixed up together.

BOOKS OF REFERENCE.

WEAPONS OF WAR (Waffenlehre). By Major-General R. Wille. 48 pp. 8vo. Berlin, 1910. Eisenschmidt. 2s. 6d.

This forms the sixth bibliographical addendum to the third edition of Major-General Wille's exhaustive treatise on literature dealing with weapons of war. The following are new headings of this year's addendum :—"Captive balloons, airships and aeroplanes." "Projectiles and weapons for their equipment and attack." "Searchlights."

CAVALRY.

WAR AND THE ARME BLANCHE. By E. Childers. 379 pp., with Introduction by Field Marshal Earl Roberts, V.C., K.G., and index. 8vo. London, 1910. Edward Arnold. 7s. 6d.

* The titles of all books are given in English ; this does not indicate that the books have been translated. The original title in the language in which a work is written, if not in English, is given in brackets.

Digitized by Google

In this book Mr. Erskine Childers maintains, and claims to have proved, that for mounted troops in modern war the *arme blanche* is "as dead as the dodo." The essential points of the theories he advances are—that the rifle is always the master of the sword; that although the latter may be of use on some occasions those occasions are very few, and that even then the rifle can be used instead of the sword, with better results; that it is as impossible for mounted troops to become efficient in the use of both rifle and sword as it is for a man to serve two masters; and that the only way to ensure the efficient training of our cavalry in the use of the rifle is to deprive it of lance and sword altogether. Mr. Childers favours bold offensive action, but always with the object of overwhelming the enemy by fire and never with the object of using cold steel. Cavalry charges he believes in, but not the charge as now understood; in his view cavalry should charge to "within 5, 10, 50, or 100 yards" of the enemy, and then shoot him down, either from the saddle, or dismounting to fire. In the term "cavalry" he would include all mounted troops, maintaining that all should be armed alike and act on the same principles. Fire from the saddle should be freely used, even, it would appear, when moving at speed, as in pursuit.

* * * * *

Although we maintain that the *arme blanche* is by no means obsolete, it must be admitted that if Mr. Childers's contention could be upheld as to the impossibility of training cavalry to the efficient use of both rifle and cold steel, there would be a strong case against the retention of sword or lance. The arguments given in the foregoing pages refer more particularly to the battlefield, on which the results of all military operations are decided. Even on the battlefield, however—still more in the operations preceding the battle—it cannot be denied that for one opportunity of using cold steel effectively there will be many of using the rifle. For this reason there can be little doubt that, if cavalry cannot be made efficient in both weapons and must be restricted to one, that one should be the rifle.

* * * * *

We believe that cavalry which is capable of using either weapon, as occasion may demand, will be more useful in war than cavalry which can only use one of the two. We believe that the possibility of becoming efficient in both must remain a matter of opinion until cavalry which has been carefully trained to both has been fully tried in war. And we believe, meanwhile, that the opinion of experienced cavalry officers on training is a safer guide to follow than the opinion of Mr. Childers. Their opinion is that regular cavalry can be trained to both. It must be remembered that our present peace training aims at producing dash, cohesion and discipline, combined with an offensive spirit and good horsemanship; and that, even if Mr. Childers proves correct in his views, the time spent in inculcating these qualities cannot be said to have been thrown away, unless it can be proved that the training in fire tactics has been neglected in consequence to a dangerous extent.

* * * * *

The combination of the power of the two weapons seems to us the ideal to aim at and we cannot agree that it is beyond our reach.

It may be that there is sometimes a tendency to favour training with the steel weapon at the expense of training with the firearm. We agree that this is unsound, but we do not agree that it is necessary to take away sword and lance altogether in order to correct this tendency, and we think that in proposing such a remedy Mr. Childers has rushed into the extremes that he complains of in others.

FORTIFICATION AND MILITARY ENGINEERING.

THE ORGANIZATION OF GROUND ON THE FIELD OF BATTLE (L'organisation du terrain sur le champ de bataille). By Capt. G. Bastien. 172 pp., with diagrams. 8vo. Paris, 1909. Lavauzelle. 2s. 6d.

The leading idea of this book is the defensive-offensive to check the attack in such a manner as to enable an effective counter-stroke to be delivered.

The defending troops are divided into the advanced guard, occupying detached entrenched positions in front, and the main body, entrenched in rear. The advanced guard is to check and, if possible, immobilize the enemy; the main body is to counter-attack him.

Digitized by Google

The general officer commanding decides as to the tactical organization of the defence. He then divides the ground and the troops into sections, and the commanders of sections ride forward to reconnoitre and report as to the entrenchments which will have to be constructed. On receiving these reports the general officer commanding distributes the technical troops, tools, etc., to the sections, and he and the Chief Engineer ride round to see that touch is maintained between the defences of the sections.

In the meantime the troops march straight to their sections and commence work with the 181 portable tools carried by each company. If the time available is short, the tools, etc., are distributed without waiting for section reports.

The tactical organization of the defence is based on the lines of attack open to the enemy. Each such line is guarded by a separate section of the advanced guard. The main body is stationed in the offensive section, that is, the section most favourably situated for delivering a counter-attack.

The entrenchments of each section consist of natural or artificial supporting points connected by successive lines of detached trenches or works. Dummy entrenchments are freely used.

Each individual position is defended at first by long-range fire from advanced posts and from guns under cover behind the position. The main line of defence is not disclosed till the attack advances to short range.

Dead ground in front of the position must be held, unless it can be swept by flanking fire.

Natural parapets are to be used as far as possible; failing these, shelter trenches with low inconspicuous parapets must be dug.

In arranging entrenchments, the guiding principle is: "Do everything which, if you were attacking, you would wish the defender not to do." An example illustrating this principle, with a sketch map, is given.

It is probable that the men and tools available will not suffice to execute all the necessary works; they must be carried out successively rather than progressively, in order of importance. Reliefs must not exceed two hours. Ploughs are of great assistance in making trenches.

In Part II. the theoretical propositions laid down in Part I. are applied to a concrete case, that of a division defending the valley of the Oise. The example is worked out in great detail, and includes general and special ideas, appreciation of the situation, orders and reports. The reconnaissance of the section held by one battalion is described, and the distribution of the companies and tools is given. The works to be constructed are discussed. A specimen of battalion orders for the execution of the defences is given; this is very elaborate, and would take an hour to write.

A second example, based on the same situation, deals with the entrenchment of the main body of the force; this is treated in the same way as the first example, but the tactical situation is discussed at much greater length.

A feature of the book is the amount of written work, including reports, returns, orders and distribution tables which the author expects the officers to execute. The author requires the commander of a section to decide every detail of the works to be executed, and leaves nothing to the initiative of subordinate commanders on the spot.

ENGINEERS IN COMBINATION WITH THE OTHER ARMS (L'Emploi des Troupes du Génie en liaison avec les autres Armes). By Capt. Camut. 72 pp., with 1 map. 8vo. Paris, 1910. Chapelot et Cie. 1s. 6d.

This is a useful book for the young Royal Engineer officer. The author takes the tactical problems set in the *Journal des Sciences Militaires*, and shows what part the divisional and army corps engineer companies ought to play in the solution. Especially interesting is his insistence on the necessity of the officer commanding a company reconnoitring the country in advance of his unit, and thus seeing what are the likely tasks it will have to perform and what are the available local resources.

FIELD FORTIFICATION. PART I. TECHNICAL [Règlement pour l'instruction speciale des troupes du génie dans l'Armée Russe. Fortification de campagne Partie 1^e^. Technique]. (Translated into French by Capt. G.

Digitized by Google

Wehrlin and Capt. J. Virlet). Published by the French General Staff. 272 pp., with 204 plates and illustrations. 8vo. Paris. Chapelot et Cie. 3s. 4d.

The Russian Manual of Field Fortification gives evidence of the changes which have been introduced into field engineering methods by the experience gained in the Russo-Japanese War. Fieldworks of all kinds played a prominent part in that war; and the deliberate nature of the operations led to a development of works which differed little from those formerly admissible only in siege warfare. This development does not detract from the value of the lessons of the Russo-Japanese War, but discretion must be exercised in their application. The necessity for the concealment of works, and for ample means of communication within and to them are keynotes of the book. The entrenchment of machine guns and of field artillery is dealt with exhaustively, 65 pages and 50 plates being devoted to artillery alone. The sections relating to the organization of defences and redoubts, the preparation of villages and woods for defence, and the use of ground are of peculiar interest. The illustrations, though small, are clear; dimensions are given in metres. The translation is well worth study, and should prove of particular interest to artillery officers.

Features of the book.—Chapter I. deals with fire trenches, shelters, communications, cover for machine guns. The machine-gun emplacements are usually designed in pairs. An example is given of an entrenchment for four machine guns, placed in front of the main firing line so as to flank its whole length. Chapter II. treats of the entrenchment of field artillery. The tactical siting of gun positions is considered; many varieties of gun and howitzer emplacements are illustrated, observation posts, telephone and battery commanders' shelters and facilities for ammunition supply are dealt with in detail. Chapter III. is concerned with closed fieldworks and redoubts. The necessity for traverses and blindages is emphasized. A thickness of 7′ of earth is the protection proposed to resist the fire of field howitzers. Chapter IV. is devoted to the organization of field entrenchments, both as regards development of fire and for the convenience of the troops. It includes matters such as the supply of ammunition, ranging, rifle rests, provision of latrines and water supply for the fighting troops. Chapter V. discusses the tactical organization of defences, the special treatment of roads, railways, houses, villages and woods for defence. Examples are given showing defences proposed for typical Russian, German, and Chinese villages. Special attention is drawn to the preparation of a second position, and to the delivery of counter-attacks in such cases. Chapter VII. deals with obstacles of all kinds. Chapter VIII. refers to methods of concealment, the use of dummy trenches and masks of smoke. Ten appendices contain tables of tools, calculations of labour and materials, range tables, penetration data, etc.

THE TACTICAL EMPLOYMENT OF FIELD FORTIFICATIONS (Essai sur l'emploi tactique de la fortification de campagne). By Colonel L. Piarron de Mondesir. 132 pp., with 9 maps and diagrams. 8vo. Paris, 1910. Berger-Levrault. 2s. 6d.

This is the fourth edition of a well-known work first published in 1904. The author, formerly a professor at the French Staff College, is a great authority on all matters connected with military engineering, and the theories advanced by him in this volume are of considerable interest.

Colonel de Mondesir has divided his book into three parts; the first deals with temporary field fortifications pure and simple, the second with semi-permanent defences, and the third with a concrete example of the works to be executed in the occupation of a position. Parts I. and III. are the most interesting, and the author has stated his opinions and theories with much ability. Perhaps the most important of his contentions is that troops acting on the defensive should generally occupy the rear edge of a plateau, where they are less exposed to the fire of the hostile artillery. Colonel de Mondesir says that the forward slopes of such a position can be swept by oblique fire, whilst the direct fire of the defenders should be reserved for the moment when the attacking infantry has reached the forward crest. He insists that the adoption of a defensive attitude must be only temporary, and that the offensive must be assumed as early as possible with all the available strength, a principle which is in accordance with our own regulations.

Digitized by Google

THE PRINCIPLES OF FORTIFICATION AND COMMUNICATIONS (Grundriss der Befestigungslehre sowie des Verkehrs-und Nachrichtenwesens). By Capt. W. Stavenhagen. 338 pp., with appendix 60 pp., 8 plates, and an index. 8vo. Berlin, 1910. Mittler. 11s. 6d.

This is the fourth edition of the treatise, the previous edition having been written prior to the Russo-Japanese War. It is a very comprehensive work, and the principles are copiously illustrated by references to all the most important existing inland and coast fortifications.

The work is divided into two parts. Part I. deals with Fortification, and is subdivided under the headings: "Peace, or Permanent Fortifications," and "War Fortifications." Under Peace Fortifications the author discusses the defence of a State by means of fortifications, illustrating this by the methods employed by Germany, France, Russia, the British Empire, and other Powers. In the tactical and technical portion of this subhead both inland fortresses and coast defences are dealt with in detail.

War fortifications are treated under the headings of Provisional and Field Fortifications, and there are numerous references to the methods employed in various countries and in actual wars.

Part II. deals with the science of communications. Under this somewhat comprehensive heading the author treats of land communications (viz., roads, railways, and mechanical transport), water communications, and the communication of news and orders. Under this last subhead are included telegraphy, airships, motor cycles, *ski*, field post-office and pigeon-post. A chapter is devoted to methods of interrupting communications.

The appendix deals with the details of weapons, materials, dimensions of works, etc., and contains a very useful list of modern literature on the subject of fortification. Some 200 illustrations are contained in the plates at the end of the book.

HISTORICAL.

THE MILITARY LIFE OF MARSHAL NEY. Vol. I. (La Vie Militaire du Maréchal Ney). By General Bonnal. 418 pp., with portraits, autograph letters, and 8 maps. Large 8vo. Paris, 1910. Chapelot. 8s. 4d.

The first instalment of General Bonnal's work covers 35 years, from the birth of Ney on 10th January, 1769, the same year that Napoleon and Wellington entered the world, until 5th January, 1804, when he was the representative of the Republic in Switzerland. There is no preface, but it is evident from the contents that the volume is mainly based on the personal papers of the Marshal. A military account of the operations in which he took part is added to make a continuous and coherent history. The work is not so much a biography as the story of the hero's public life.

The son of a cooper, Michel Ney, familiarly known to his comrades and men as "Rougeot" (Carrots), first tried life in a notary's office and an iron foundry; at the age of 20, less one month, he ran away from home and enlisted in the cavalry and found his career. He served over two years before getting his corporal's stripe and a year more before he was sergeant; then war broke out and 4½ years later he was general of brigade. His rapid promotion was due partly to election by his comrades and partly to reward for personal bravery.

Ney seems to have had considerable doubts as to his own ability for high command; in April, 1799, he formally refused the promotion to general of division, writing in his official letter, "I should have accepted the honourable decision if my talents were able to respond to the benevolence of the Government." The Directory persisted, however, in promoting him. When ordered later in the same year to take over the temporary command of the Army of the Rhine, Ney again addressed the Directory, and asked them if they had "weighed the insufficiency of my military qualifications for such an important post in these critical times." Although he had no great knowledge he had at least "energy, activity, intelligence, in a word, the will to conquer," and the esteem of the army, valuable assets which his predecessor Leonard Müller never possessed. His want of confidence in himself was exhibited even in his wooing.

As a commander of an army General Ney issued very "detailed instructions, one for

Digitized by Google

each large unit, in which the cantonments of companies and squadrons were determined, the alarm places fixed, the principal eventualities indicated, with the measures to be taken in each case." "The Commander-in-Chief, it is seen," says General Bonnal, "entered into details and gave minute orders instead of fixing the object to be attained and leaving the choice of means to his lieutenants. This vicious method, employed on account of the prime incapacity of the subordinates, was continued during all the wars of the Revolution and Empire ; it gave brilliant results as regards unity of action, but such results could not be but ephemeral ; for a commander, even if he is a Napoleon, must exhaust and tire himself out if he has to foresee everything and order everything."

Ney's "General Instructions," issued when he was commanding the cavalry of the right wing of the Army of the Rhine, which consist of 23 articles, hardly give the impression of having been drawn up by a great cavalry commander ; *e.g.* :—

"Article 8.—By day and while advancing, each regiment will be preceded by a section as advanced guard.

"Article 9.—Bivouacking will always be resorted to with exceptions. (As General Bonnal remarks, 'the bivouac is deadly to cavalry').

"Article 10.—Boot and saddle 3 a.m., relief of piquets 4 a.m., while the main body mounts and awaits orders. (This was, however, the custom of the time).

"Article 12 (Article 11 is lacking).—The brigade commanders and paymasters will occupy houses near the bivouacs so that they can devote themselves to clerking. (*Se livrer aux travaux d'écriture*).

Article 22 is the best. It reads: "Carbines carried *en bandoulière* having caused great inconvenience in the recent campaigns, a number of troopers have lost them. The carbine is therefore to be carried by the horse by means of a system of straps."

In 1797 General Ney transferred to the infantry a hussar "for having killed several Government horses by overriding them." In notifying this he says "I hope that this example, which has already had the best effect, will obviate the necessity of my having to give a similar punishment for a long time," and General Bonnal remarks, "This is a right that generals commanding cavalry divisions should have at all times."

Generally the book will be found of interest because it gives a good picture of army life of the period and of the relations of the generals to their staffs and troops. It confirms the view usually held with regard to Ney that his sword arm was better than his head, that he was a loyal subordinate, but without the instruction and education necessary to make a good tactician or a clever strategist.

ORGANIZATION AND ADMINISTRATION.

SUPPLY OF ARMIES IN THE FIELD (Verpflegung der Armeen im Felde). By Feldmarshalleutnant Otto von Meixner (Austrian Army). 103 pp., with map. 8vo. Vienna, 1910. Seidel & Son. 4s.

The sixth and concluding section of this work is divided into two parts, of which the first deals with the Russo-Japanese War. The theatre of operations is first described with special reference to supply questions and communications, and then the opposing forces and the organization of their supply and transport services are dealt with in detail. In the second part of the book the supply services in the Austro-Hungarian, German and Russian Armies are studied.

VON LÖBELL'S ANNUAL REPORT ON ARMIES AND MILITARY MATTERS, 1909 (v. Löbell's Jahresberichte über das Heer-und Kriegswesen : XXXVI. Jahrgang : 1909). Edited by Major-General v. Fröbel. 484 pp., with 7 diagrams in the text and 8 illustrations. 8vo. Berlin, 1910. Mittler. 11s. 6d.

A change of editorship of this valuable annual has taken place, owing to the death of Lieut.-General v. Pelet-Narbonne, who was for many years its editor.

The same lines have been followed as in previous editions, Part I. being a guide to the military systems of foreign countries; Part II. dealing with the development of tactics, fortification, means of communication, material and recent military literature; while Part III. gives an account of the Spanish War in Marocco and the usual obituary for the armies of all nations.

Digitized by Google

The chief points of interest in Part II. are the reviews of new drill books or amendments, viz., Germany, Infantry Drill, p. 271; Cavalry Drill, p. 300; Foot Artillery Drill, p. 321; England, Field Service Regulations, p. 286; Japan, Infantry Drill, p. 276; and the general remarks on permanent fortification, p. 338.

POLITICAL.

BRITISH INDIA (L'Inde Brittanique). By Joseph Chailley. 530 pp., and 2 maps. 8vo. Paris, 1909. Armand Colin. 8s.

M. Joseph Chailley, who has already established a reputation by his former works on Indo-China, Madagascar, etc., has spent 10 years over this book and has made several voyages to India for the purposes of study and at long enough intervals to enable him to form a correct estimate of his first impressions.

The book is divided into two parts.

Part I. contains chapters on the country itself and Native Society and Natives of all classes. Part II. contains chapters on the Native States of India, the Tribes and Chiefs in Burmah, Agricultural and Landowning Classes, Law, Justice, the Problem of the Education of Natives, the share of Indians in the administration of their own country.

The author does not formulate his conclusions and leaves the reader to form his own. The book is most carefully and thoroughly written.

Chapter II. Part I. gives an interesting account of the present situation from a Frenchman's point of view.

TRAINING AND EDUCATION.

THE GERMAN STAFF COLLEGE ENTRANCE EXAMINATION PAPERS, 1910, WITH SOLUTIONS (Die Aufgaben der Aufnahmeprüfung, 1910, für die Kriegsakademie). By Major Krafft. 66 pp. 8vo. Berlin, 1910. Mittler. 1s. 6d.

This book contains the papers set at the 1910 examination for admission to the *Kriegsakademie*, together with solutions and hints as to what to read in order to prepare oneself for the examination. The various subjects are as follows:—Military history, tactics (general and applied), technique of artillery and small arms, fortification, reconnaissance, topography, history, geography, languages (French, English and Russian), mathematics.

STRATEGICAL AND TACTICAL.

TACTICAL PROBLEMS (Première Série de Travaux Tactiques publiés par le Journal des Sciences Militaires. Thèmes et Solutions). 5 maps. Paris, 1909. Chapelot. 3s. 4d.

A useful collection of tactical problems and their solutions. The general idea, taken from the situation at the end of December, 1870, is the same for the entire 18 problems. The French maps are at first somewhat difficult to read. The book is interesting because the solutions have been worked out by a committee of staff officers and give an insight into the tactical ideas prevailing in the French Army.

A PRÉCIS OF STRATEGY. By Brevet Lieut.-Colonel W. D. Bird, D.S.O. 171 pp. 8vo. London, 1910. Hugh Rees. 3s. 6d.

Colonel Bird deals with his subject in a clear, concise and attractive manner, and his book, which fills a want, should pave the way to a deeper study of the subject.

He bases his information mainly on the correspondence of Napoleon and Moltke and the works of Jomini, Hamley, Von der Goltz, Blume, Henderson, Derrécagaix, Bridge and Mahan.

He has divided his work into five short chapters dealing with—National defence, peace and war strategy, offensive and defensive, base and lines of communication, movements, plan of campaign, concentration, strategy as influenced by sea power, geography, obstacles, weather, moral factors, good information, strategical formations, exterior and interior lines, positions on the flank of an advance, detachments, fortresses, pursuit and retreat, conduct of operations.

Digitized by Google

TACTICAL STUDIES ON THE CAMPAIGN OF 1806 (Études Tactiques sur la Campagne de 1806). By Capt. Bressonnet of the French Infantry. 395 pp., with 18 maps. Large 8vo. Paris, 1909. Chapelot. 10s.

This book is published by the Historical Section of the French General Staff. Its talented author died in 1908, before reaching the age of 40, and it has been prepared for the Press by Lieut. Boudot. It contains a very detailed account of the Battles of Saalfeld, Jena and Auerstedt, with comments.

While recent German authors have attributed the double defeat of Prussia on the 14th October, 1806, to her army having consisted of paid troops instead of a nation in arms, and to slavish adherence to the tactics of Frederick the Great, Capt. Bressonnet makes it clear that there was little to choose between the Prussian soldiers of 1806 and 1814-5. Jena and Auerstedt were by no means easy victories; they were purchased at very heavy loss, Davout's Corps leaving two-thirds of its numbers on the field, Suchet's Division one-third, etc., and the struggle on both fields lasted nearly 10 hours.

The French author considers—here agreeing with von Clausewitz, whose book *Nachrichten über Preussen in seiner grossen Katastrophe* (Information regarding Prussia in her great Catastrophe) he does not appear to have read, for he does not quote it – that the defects were principally due to the incapacity of the Prussian commanders and senior officers, men promoted to high rank solely because they had held junior staff appointments or performed deeds of personal bravery in the days of Frederick. The great service rendered to Prussia by her King was that after 1806 he ruthlessly removed such individuals from the army.

As regards tactics it is stated that "it is entirely inexact to pretend that in 1806 two absolutely different tactics were in presence, just as it is not true to say that the French and Prussians practised the same tactics." The battles offer uniformly the aspect of two lines of battalions, more or less supported by reserves, deployed opposite each other at musket range and firing on each other for hours." One of the differences lay in the employment of skirmishers (*tirailleurs*, the equivalent of the modern scout, about 40 or 50 per battalion); the French used them to prepare and cover the advance of their units, the Prussians collected them and used them in the general line as light infantry; in consequence "the advance of the Prussian battalions in open ground was rendered more costly, but the absence of skirmishers did not prevent them holding their ground stubbornly and resisting vigorously until the action of fresh French troops on the weak points of the line or on their flanks obliged them to give way."

A further point of difference was the treatment of localities. "The French seized the villages and used them for manœuvres. The Prussians, on the contrary, seemed to avoid them. The latter, one would say, considered localities as an inconvenience in a pitched battle, the French looked on them as indispensable *points d'appui*." This use of localities gave the French an important advantage.

The secret of the victories is to be found in the skill with which the French generals understood how to adopt their formations to the ground and circumstances, to make use of localities, to put in their reserves and combine their efforts. The Prussians, on the contrary, lacked skill and resolution and acted without combination; they thought the essence of the Frederician tradition lay not in the vigorous offensive but in the use of echelon, and behind the echelons there was no reserve. "On the side of the French there was careful concentration, and at first a disposal of the troops in considerable depth. Their forces were deployed successively to present a line of fire as extended as that of the adversary; there was an extreme economy in the front line, but the distances used left room for manœuvre; finally, the reserves were handled parsimoniously, but expended to the last man at the decisive moment."

The author concludes that "the value of an army is to be measured entirely by that of its cadres and its generals. The soldier always fights well; but his efforts are always useless if the direction of the army lacks skill."

STRATEGIC STUDIES (Études Stratégiques). By Commandant Mordacq, commanding 25th Battalion of Chasseurs of the French Army. 270 pp. Small 8vo. Paris, 1910. Fournier. 2s. 11d.

Digitized by Google

Commandant Mordacq has produced a very attractive and valuable little work, simple enough to be understood by all who have a knowledge of military history, yet well worthy of study. At the close of the book he sums up his views, in agreement with Von Clausewitz, that "strategy represents an eminently simple art, yet difficult in the sense that before it can be approached, it requires long practice of the military profession and a profound knowledge of the tactics of the three arms." For these reasons he approves of its not being taught at the French Staff College "except incidentally in studying a campaign." "The officers who are at the college are too young, they have not yet acquired a sufficient maturity of mind to enable them to be initiated in the conduct of the masses which compose the armies of to-day." He thinks that an officer's military instruction should be completed by a course of strategy when he reaches the rank of lieut.-colonel, if it is intended to promote him to command.

OPERATIONS IN WOODED COUNTRY (La manœuvre en terrain boisé). By Lieut. Barthélemy. 141 pp., with 18 Diagrams. 8vo. Paris, 1910. Lavauzelle. 2s.

The author has had considerable experience of forest life in the Vosges, and has produced a useful and interesting book. He shows the necessity of careful training for wood fighting, describes the different kinds of woods and their characteristics, and gives suggestions as to the tactical methods to be employed. He emphasizes the value of experts with a thorough knowledge of woodcraft, with special reference to the French "Chasseurs Forestiers," or forest guards, who should prove extremely valuable in a campaign on or near the eastern frontier of France.

TRAVEL AND TOPOGRAPHICAL.

TRANS-HIMALAYA: DISCOVERIES AND ADVENTURES IN TIBET. By Sven Hedin. 2 volumes. 859 pp., with 388 illustrations from photographs, water-colour sketches, and drawings by the author, and 10 maps. 8vo. London, 1909, Macmillan. 30s.

Dr. Sven Hedin explains that his main object was to see with his own eyes the unknown districts in the midst of Northern Tibet, and, above all, to visit the extensive areas of unexplored country stretching to the north of the Upper Brahmaputra, which had never been seen either by Europeans or natives of India. He was strongly of opinion that there must exist one or more mountain systems, running parallel with the Himalayas and the Karakorum range, peaks and ridges, lakes and rivers, which had not yet been revealed to any explorer. He also wished to visit one or more of the great lakes of Central Tibet, which had been discovered by Nain Singh in 1874, but had never been seen by a European. The great traveller also desired to discover the source of the Indus, which had never yet been inserted in its proper place on the map of Asia.

On the 16th October, 1905, Dr. Sven Hedin left Stockholm and, travelling viâ Constantinople and the Black Sea, through Turkish Armenia, across Persia to Seistan and through the deserts of Baluchistan to Nushki, a journey which he dismisses in a very few words, reached Quetta in May, 1906. From Quetta he went to Simla, and thence to Srinagar and Leh. After obtaining a Chinese passport, permitting him to travel in Chinese Turkestan, he started on his adventurous journey from Leh on the 10th August, 1906.

Starting from Leh, the explorer reached Shigatse in February, 1907, having lost almost all his transport animals from cold, and after innumerable dangers and difficulties, and in spite of the numerous attempts on the part of the Chinese officials to turn him back. Leaving Shigatse in March, Dr. Sven Hedin, with one or two divergencies, followed the course of the Brahmaputra, and made for the holy lake of Manasrowar. Thence following the course of the Gartok River, he marched to Gartok. He touched the Nepal-Tibet frontier once, discovered the sources of the Brahmaputra, the Sutlej and the Indus, and crossed the Trans-Himalaya five times. He reached Gartok on the 26th September, 1907.

Once there, he realized that there was no chance of his being allowed to continue his explorations, so he determined to disguise himself and to return to Ladak, penetrate into Tibet from the north and traverse the whole country once more. In this way he hoped

Digitized by Google

to gain his object, which was to cross the space shown blank on all the maps of Tibet, and marked "unexplored."

He therefore made for Drugub, two or three marches from Leh on his original route, and thence, early in December, 1907, started once more. After striking due north for about 18 marches, he turned east for about the same distance, and crossed his first route again at a point on the southern boundary of the unannexed province of Aksai-Chin. Marching south-east, he traversed the unexplored country within the boundary of his first route and then, when about half-way across, he struck almost due south to the Brahmaputra, touching that river close to where he had struck it the year before. Thence he marched as far as the Lake Teri-Nam-Tso, and then, striking due west, he crossed the line of his second route some 20 marches north of the Brahmaputra, and again reached the holy lake of Manasrowar. From there he followed roughly the course of the Sutlej, and reached Poo on the 28th August, 1908. A few days later he was again in Simla.

THE GATES OF INDIA. By Colonel Sir Thomas Holdich, K.C.M.G., K.C.I.E., etc. 555 pp., with index and 5 maps. 8vo. London, 1910. Macmillan. 10s. 6d.

The work, which is described by the author as "an historical narrative," is one which will appeal strongly to the student of Asian geography. To a wide and intimate personal knowledge of the subject upon which he writes, Sir Thomas Holdich has added the results of prolonged study and research. Commencing with an examination of the earliest relations between East and West, he traces the history and geography of Central Asia in turn through the days of Greek, Arab, English and French exploration. Persia, Seistan, Afghanistan and Baluchistan, the "Gates" of India, are dealt with in exhaustive detail, and although the literature which has already been produced bearing on these same regions may be truly described as stupendous this latest addition to it can claim that it throws light upon many spots which have hitherto been obscure. It also points the way for further advances in directions in which modern science will enable the explorer of the future to unravel problems which were beyond the powers of those of days gone by.

SIKKIM AND BHUTAN. By J. Claude White, C.I.E. 326 pp., with a map, index and numerous illustrations. 4to. London, 1909. Arnold. 21s.

The book is the outcome of 21 years' experience on the north-east frontier of India. The author enjoyed unique advantages in studying the geography and people of Sikkim, Bhutan and Southern Tibet, and has succeeded in compiling a most useful and instructive record of his observations. Sikkim is first dealt with and a short history of the State is given, followed by interesting accounts of expeditions and explorations in the interior.

Bhutan is more fully treated and the historical account of the country given by the author is particularly valuable as it represents practically the only work that exists on the subject. Not the least interesting portion of the book is that which reviews and explains the foreign relations between Bhutan and the neighbouring states of China, Tibet, Nepal and India. A chapter is also devoted to the records of the various missions which have visited the country from as far back as 1774.

MISCELLANEOUS.

FINANCE AND WAR. By Capt. R. S. Hamilton Grace, 13th Hussars. 72 pp. 8vo. London, 1910. Hugh Rees. 2s. 6d.

A short book dealing with the following:—The cost of the principal wars during the past 200 years; how the cost of wars during the past century has been met; the effect of these wars on money; England compared with other nations as regards revenue and population.

The author concludes the book with some deductions. He holds that no nation will be stopped from plunging into war by the want of money; that loans will always be forthcoming; that the cost of war is not so stupendous as has been imagined, though it may be crushing to the vanquished, it may possibly be trifling to the victor; that during war money has little effect, it is before in preparing for it and afterwards in making peace that its effect is felt; that England should form a national insurance by preparing for war; that great wealth is of little avail against a successful invader.

Digitized by Google

WIRELESS TELEGRAPHY.

FIG. 1.

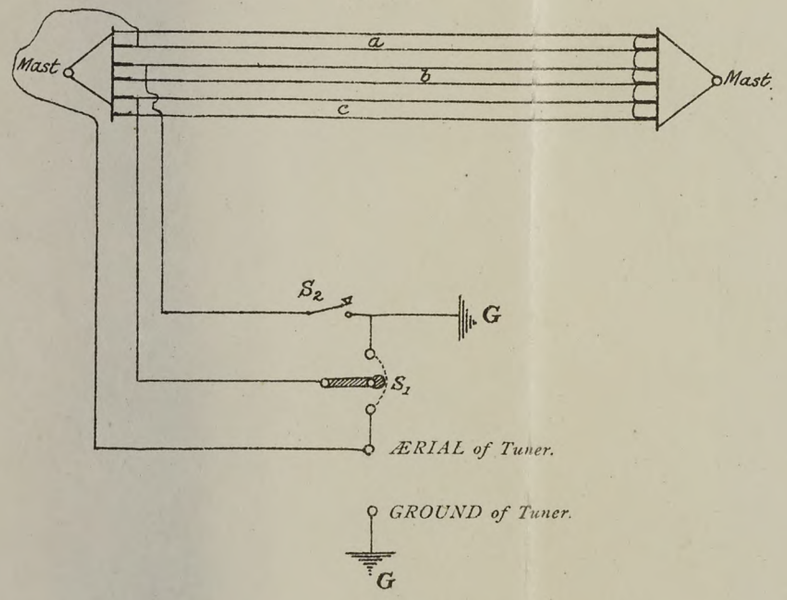
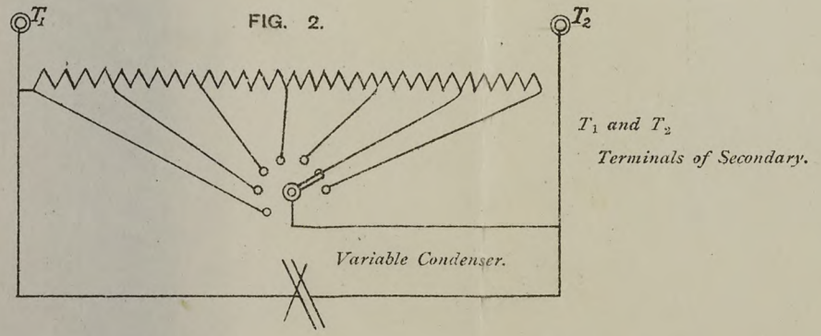


FIG. 2.



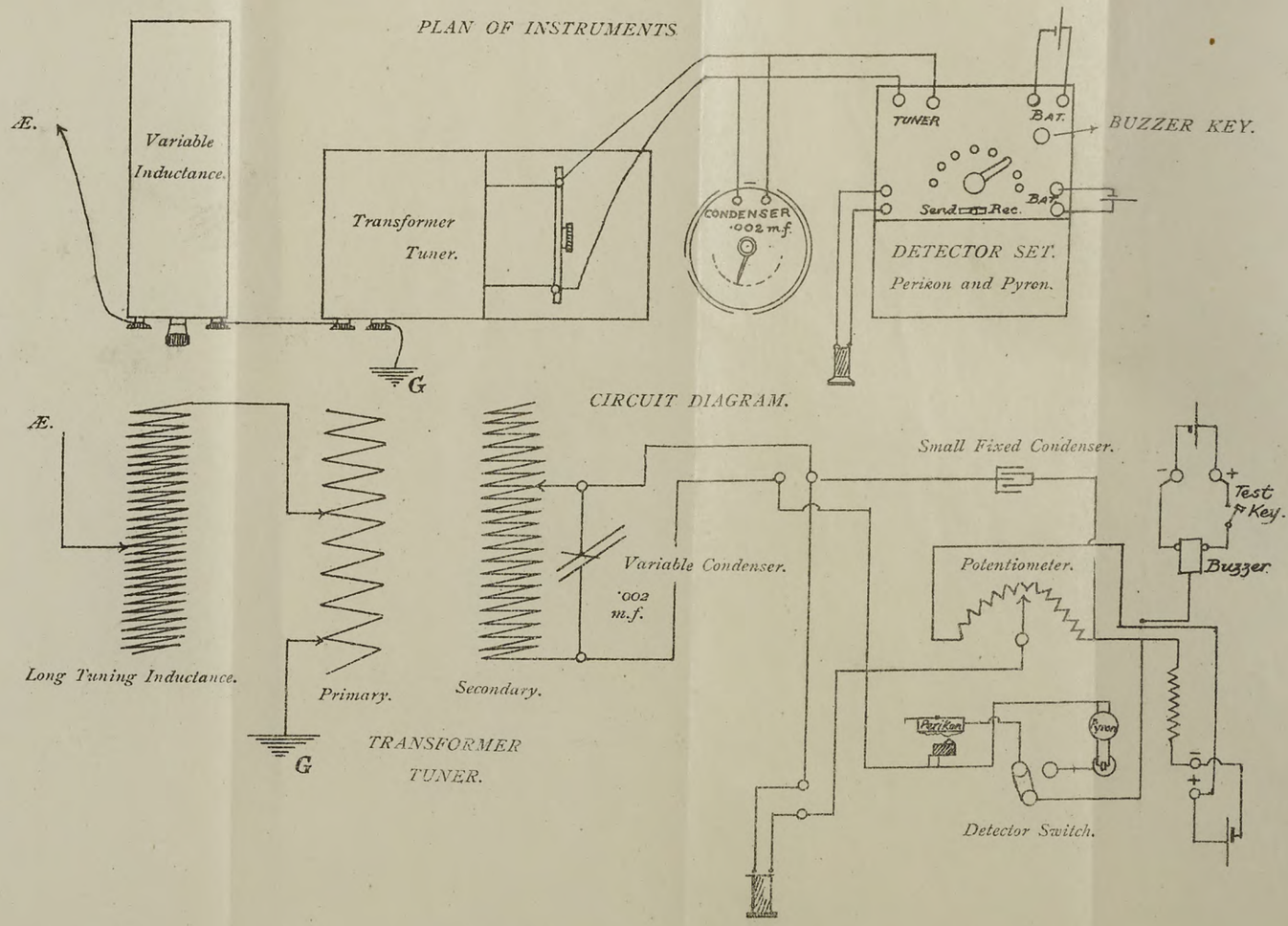
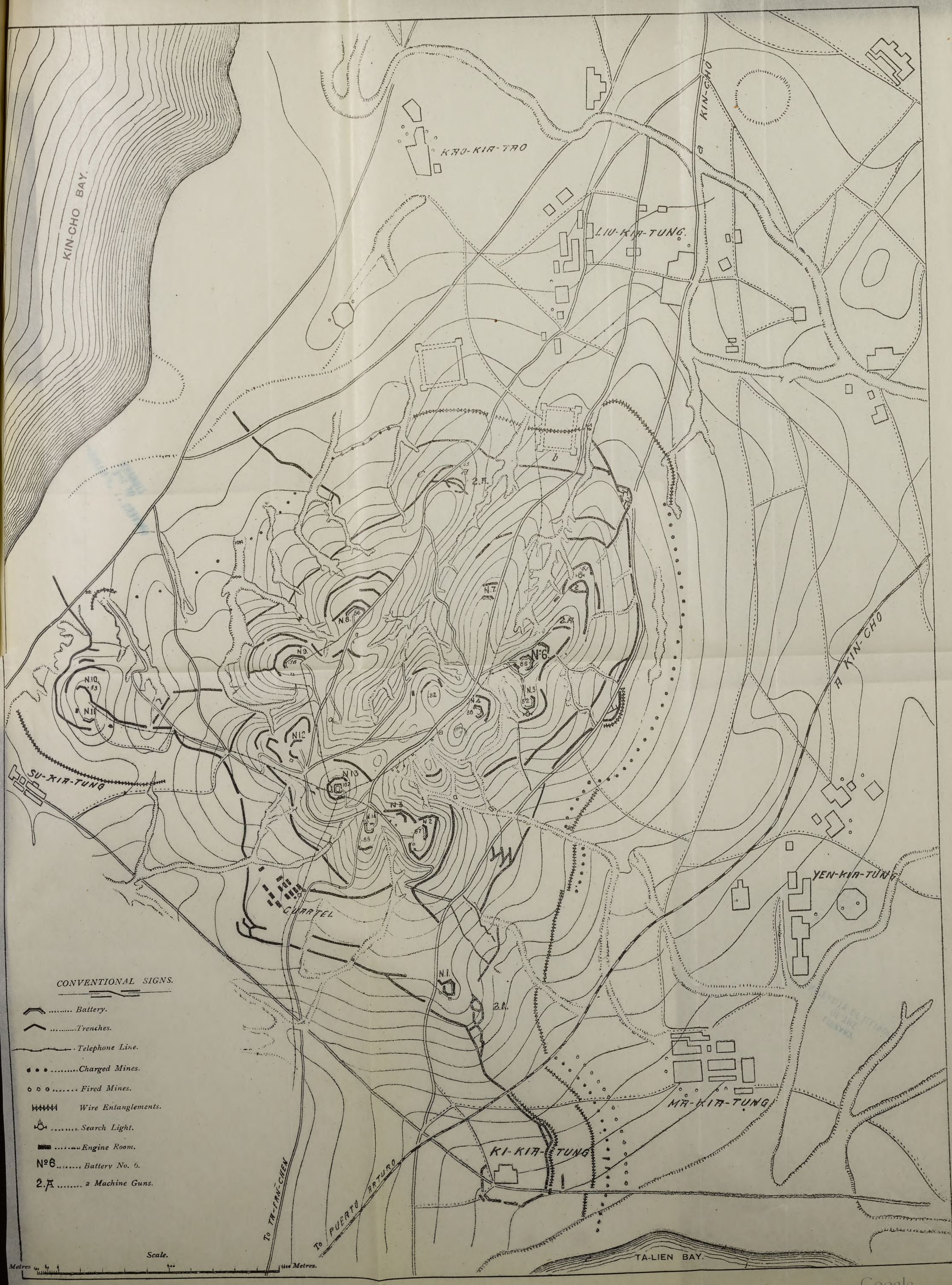


DIAGRAM OF CONNECTIONS.

Digitized by Google

Digitized by Google



Digitized by Google

LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

Digitized by Google

Digitized by Google

GIRDER ERECTION OVER ROHI BEAS

Photo No. 1.—Erected Spans.
Rivetting is going on on the first span.
The second and third spans are still supported on camber jacks.

Photo No. 2.—The 6″ Span in course of erection.
Showing the bottom booms just laid in position and roughly bolted up.

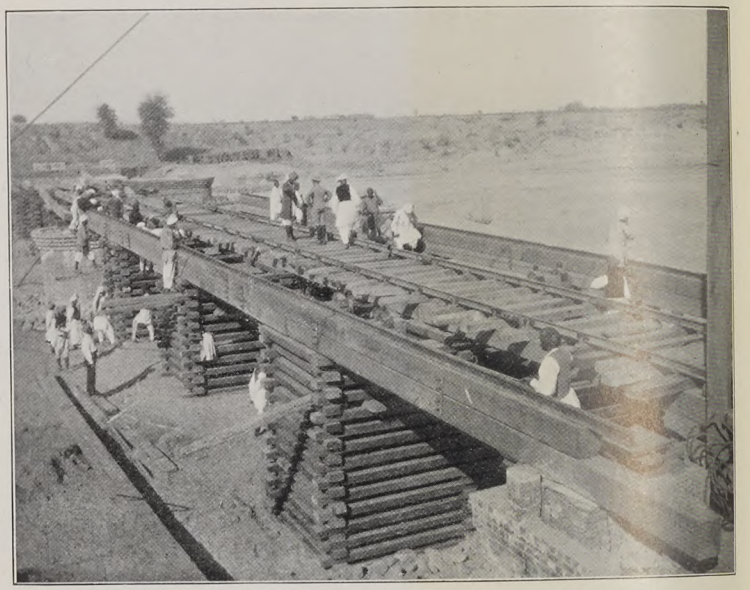


Photo No. 3.—Cribwork and Gantry Track.

Photo No. 4.—Hoisting a Vertical Strut into position (gussets bolted on).

Digitized by Google

GIRDER ERECTION OVER ROHI BEAS, PUNJAB, BY NO. 1 COMPANY, 1ST P.W.O. SAPPERS & MINERS.

By LIEUT. O. E. U. INGHAM.

THE following is a brief account of some girder work carried out in December, 1909—March, 1910, by No. 1 Company, 1st P.W.O. Sappers and Miners, on the North Western Railway.

The bridge in question has been built to carry the new double line over the Rohi Beas nullah, situated 1 mile west of the River Beas and some 60 miles east of Lahore, in the Beas (D.L.) Sub-Division of the Lahore District—Executive Engineer, Mr. E. Lister, P.W.D., and Sub-Divisional Officer, Lieut. E. P. Anderson, R.E. It is sited 100′ above the old single line bridge, which is too weak for the new engines. It consists of 2 roads of 3 spans each—total 6 spans—each 108′ 2″ centre to centre of bearings. The piers and abutments, constructed on wells, had been built by Lieut. Anderson during the previous spring.

The work for the company, which was undertaken on the contract system (*i.e.* full civil rates are paid by the employer and from the proceeds the O.C. has to pay Engineer and working pay, all expenses connected with journey to and fro, extra cost of food, etc.), consisted of "erection of girders complete including all riveting, erection and dismantling of falsework, painting and scraping of surfaces in contact, and selecting and bringing to site the girder pieces from their positions in Beas Yard." As a matter of fact only a portion of the riveting was carried out.

The pieces of each girder were lying together but much mixed, and the first span presented much the same problem as a jigsaw puzzle.

The method of erection, previously arranged by the S.D.O., was :—Build sleeper cribs to support the girders on camber jacks and to carry a track for a gantry, and then place all the members by means of the gantry.

Crib Piers.—These were about 10′ high : new Jarrah sleepers were available which made the construction of the cribs very simple. There were 6 cribs in each span, to support a pair of camber jacks on both sides of each joint in each bottom boom.

Gantry.—As will be seen from the photos, the gantry was of somewhat novel shape. Although the top joints were transversely rather weak, it had great longitudinal stability, which was often of great use in fitting in a refractory member.

Digitized by Google

Sorting, Scraping, and Painting.—The same men should be kept on this work as they get to know where all the peculiar-shaped gussets, cover plates, etc., go, and on what side they have to be painted.

Loading.—For most of the time one 5-ton crane and one line of siding only were available: this made the loading up on to trollies of the longer pieces rather awkward. With two lines—one for the crane and one for the trollies—the loading is much simplified. Any mistake, such as loading up a piece the wrong way round, entails great delay in erection.

Riveting.—This was done by the company smiths assisted by one artificer lent by another company. The senior British N.C.O., Sergt. Eltham, had had large practical experience of riveting and had also done some girder erection with the 8th Company, R.E., in South Africa. Under his supervision some good work was put in—the men picking up the work quickly. The rivets were mostly 1" with a few ⅞". For nearly the whole time five sets of riveters were kept working—some smiths being required for the erection, and drifting up the joints. Each party was made up as follows:—

1 riveter	...	Smith artificer (corresponding to R.E. superior or very superior rating).
1 rivet heater	...	1st rate smith (do. skilled).
1 flogger	...	Generally 1 2nd rate smith.
2 holders-up	...	2 of other trades.
1 blower	...	Any trade.
6		

800 rivets were put in in the bottom booms and gussets of each span before erection commenced. These rivets were easier work than those "on bridge," put in after the girders were erected.

Riveting on an erected span was not commenced until all the joints had been drifted up fair, and service bolted up tight.

	In the Yard.	On Bridge after Girders were erected.
1. Average number of rivets per party per day. (This includes fitting together of plates, bolting and drifting up and also erection of staging)	37·6	28·9
2. Largest number of rivets in one day	92	62
3. Lowest do. do.	25	17
4. Number of rivets cut out after inspection	5·8 %	13·8 %
Total number of rivets passed ...	6,578	

Digitized by Google

Service Bolts.—The number sent out by makers with each span is small. In this case, as the erection went so much faster than the riveting, a large number were used.

Erection.—This was always started from the fixed end. The camber jacks sat down from 2″ to 3″ when the weight came, and the best way of keeping the right camber was found to be, by originally levelling the jacks 1″ to 2″ high, and then when the bottom booms were laid by raising the jacks until, judging by eye, each boom was in a nice even curve. Then when the top booms had been placed, the levels were checked again—and finally re-checked when the joints had all been drifted up. Some of the pieces had to be persuaded with a sleeper or a wooden maul, but most of them fitted excellently.

Diary of Progress.—The number of days taken was :—

Making cribs and gantry track—	
1st span and preparing pieces (scraping, painting and preliminary riveting) of 1st span for erection	12 days.
Erection of gantry	3 „
„ 1st span	15 „
„ 2nd „	7 „
„ 3rd „	5 „
Preparing for erection on upstream road including moving gantry across	6 „
Erection 4th span...	4 „
„ 5th „	3 „
„ 6th „	4 „

In addition to these days, three to four parties of three men each were engaged on each span for from three to six days drifting and bolting up all the joints fair.

Distribution of Men at Work on the Bridge.

5 riveting parties at 6	=30	100
Drifting and bolting up joints	10	
Scraping and painting	8	
Loading	18	
Erection party	16	
Cribs and gantry track for the next span ...	18	

Besides erecting the girders for the bridge, some of the carpenters and masons of the company—total 26—were employed on the erection of a 20-lever signal cabin.

The following were some points noted :—

As regards the Girders.—1. The two roads were so close together that there was not sufficient room to get a full swing with a hammer for riveting the top boom between the girders.

Digitized by Google

2. There were about 12 draughtsman's rivets in each span, *i.e.* rivets in places where they looked nice in plan but were bad for riveting.

3. For erection purposes there should be no pieces much heavier than all the others as these require special tackle.

In these girders there were in each span four pieces of top boom each weighing twice as much as any other piece in the span.

4. Every piece should be numbered clearly, stating whether the face numbered is inside or outside.

5. Bed plates should be sent from England with centre lines on them.

As regards the Erection Work.—(*a*). Bolts, rivets and drifts must be carefully looked after or they get dropped and lost.

(*b*). Enough materials—bolts, baulks, sleepers, and jacks for three or four spans are required.

(*c*). The following are required on the work :—

1. Invoice of packages and contents of same.
2. Makers' detailed drawings.
3. "Rivet and bolt list" showing the lengths and sizes of rivets to be used in each joint and the positions of the various special bolts.

(*d*). It is necessary to find out what joints and plates *must* be riveted before erection is commenced. This is not always easy.

Digitized by Google

UNDERGROUND WATER IN CRYSTALLINE ROCKS.

By Capt. K. E. Edgeworth, R.E.

With the exception of certain limestones, sedimentary rocks owe their water-bearing properties mainly to their porosity, or to their power of absorbing water. Crystalline rocks on the other hand owe their water-bearing properties to the existence of joints and fissures, the rocks themselves being practically impervious to water.

As might be expected, the extent and regularity of the jointing varies considerably even in different portions of the same rock, but it is probably not generally known that it may be sufficiently regular in certain types of rock, to enable wells to be drilled with a nine to one chance in favour of success. Joints occur in nearly all crystalline rocks when they are exposed to changes of temperature and other atmospheric influences, they frequently extend for several hundred feet below the surface, and are of sufficient magnitude to admit of the percolation of considerable volumes of water. When once a crack commences, various agencies will be at work to cause it to spread both vertically and horizontally, not the least of these being the water itself. The different cracks will intersect, and the water may thus be collected into a well from considerable distances, although the cracks will not be sufficiently large and continuous to enable the water to flow rapidly away. The cracks become less numerous as the depth increases, and the sounder part of the rock thus acts as an impervious stratum underlying the upper and water-bearing layers.

The conditions are not usually favourable for the existence of artesian or flowing wells, although certain cases in which such conditions exist will presently be described. Nor are the conditions usually favourable for the production of such large quantities of water as would be suitable for the supply of towns, as the majority of wells give less than 15 gallons per minute. Experience also shows that it is not economical to continue drilling to a greater depth than 200′ or 300′ after the surface of the rock has been struck. If the supply is insufficient, it is better to abandon the well and try again. As might be expected from the manner in which the water occurs, the wells vary considerably both as to the level and the quantity of the water supplied. Even wells close together often give entirely different results.

Information about underground water is collected by the Geological Survey Department of the United States, and is published in a series of excellent papers from which copious extracts have been made in preparing these notes.

Digitized by Google

The first State described is that of Connecticut in which a very large number of wells have been drilled and about which very full statistics are available.

CONNECTICUT.

Rainfall.—The mean average rainfall at 10 stations for the years 1893—1903 was 46″·98, and the amount is pretty evenly distributed both throughout the year and over the area under consideration.

Geology.—The greater part of the State is underlain by rocks of very great age. Unchanged igneous rocks are rare and metamorphic rock constitutes practically the whole of the crystalline areas. The metamorphic rocks are classified as crystallized limestone (marble), quartzite (compacted sandstone), phylite (an advanced stage in the development of slate), schist, and gneiss. It is in the two last named that water is generally found. The other rocks have not so far yielded satisfactory results. The terms schist and gneiss refer to the structure of the rock and not to its composition. Schist is characterized by cleavage planes which enable the separation of the rock into irregular layers of small thickness. Gneiss is more massive and implies the existence of a series of roughly parallel breaking planes along which the rock may be separated into slabs of various sizes. The production of gneiss from granite has taken place in Connecticut on a large scale. Granite masses have been stretched and squeezed, so that instead of being of uniform structure they are drawn out into sheets and definite layers, a factor which is of considerable importance in successful quarrying.

Joints.—By far the larger number of the joints in crystalline rocks are vertical or nearly so, the joints crossing each other at various angles, giving the surface the appearance of a rough screen or network. The spacing of the joints is very irregular even in the same rock. On the one hand there may be places where the joints are upwards of 100′ apart, while on the other hand there may be zones in which the joints occur every few inches. Taking an average, and counting all vertical joints in whatever direction, it is stated that the mean distance apart is probably not less than 10′ for depths up to 200′. The degree of opening between the walls of the joints is extremely variable and difficult to measure. At the surface the opening may be an inch or more, but at depths of 20′ or 30′ the joint will not usually be large enough to admit the blade of a knife. At greater depths the width of the joint is usually too small to measure, and its size can only be estimated by the amount of water which it supplies. In addition to the vertical joints, which are the most numerous and the most important from the water-bearing point of view, there is another set of joints which are nearly horizontal. They are much more regularly spaced than the vertical joints. For the first 20′ below the surface they average about 1′ apart, for the next 30′ 4′ to 7′ apart, and from 50′ to 100′ in depth 6′ to 30′ apart or even

Digitized by Google

more. Owing to the intersection of the various joints both vertical and horizontal, a system is formed by which water may travel considerable distances and which is sufficiently regular to give the well digger a reasonable hope of success. The average well will probably intersect several joints belonging both to the vertical and horizontal types.

Number of Successful Wells.—"It is probably a conservative estimate to state that not less than 90 per cent. of the wells sunk in the crystalline rocks have given supplies of sufficient amount for the use required." Owing to contamination by sea water, however, there is a larger proportion of failures near the coast.

Depth of Water.—The total average depth of the wells is a little over 100′, of which there is an average of 20′ of surface material. The average depth of the water level below the surface is stated to be:—Hills, 19′; valleys, 11′; slopes, 15′; plains, 8′.

Quantity of Water.—The average yield of 110 wells of depths up to 300′ is 13·6 gallons per minute, the maximum yield being obtained from wells whose depth lies between 100′ and 200′. The average yield in the valleys is about 20 per cent. greater than on the hills, while the yield on the slopes is less than half that obtained from either hills or valleys. The reason for this peculiarity is not quite clear.

Flowing Wells.—The surface material which overlies the rock in the valleys, forms an impermeable layer, and flowing wells are sometimes obtained when the capping is of sufficient thickness. Six cases are actually recorded, but the supply was always small and pumping was resorted to in order to increase it.

The Piedmont Plateau.

This is the name given to a belt of crystalline rocks running parallel to the eastern coast of the United States and traversing the States of New Jersey, Pennsylvania, Virginia, North and South Carolina, and Georgia. Proceeding inland from the coast this formation succeeds the clays and gravels of the Coastal Plain, and extends to the base of the Appalachian Mountains on the west.

For various reasons the number of wells sunk in most of the States is smaller, and the information about them is much more scanty than in the case of Connecticut, but the general results appear to be similar.

In North and South Carolina the conditions are favourable for the existence of flowing wells, and a considerable number are recorded. They vary in depth from 28′ to 72′, and have a pumping capacity of from 3 to 15 gallons per minute. It is stated that the underground water flows in definite streams varying in width from a few feet to (in rare cases) more than 100 yards. Generally these underground "streams" follow the topographical features, but in some cases they flow obliquely across the ravines, showing that the line of least

Digitized by Google

resistance in the rock is to a certain extent independent of the topography of the surface.

At Atlanta a well was bored in gneiss to a depth of 2,200′ and a large supply was tapped at a depth of 1,100′ which rose to within 17′ of the surface. Some years later however the water was found to be polluted and the well was abandoned. This well is of interest not only on account of its great depth and the large amount of water supplied, but also because it emphasizes the risk of pollution when water is obtained from crystalline rocks.

NEW HAMPSHIRE.

Three flowing wells in the Portsmouth-York region are of interest, in that the impervious capping is provided by the rock itself, instead of by a separate layer of overlying clay. The wells are near the coast, but the water is quite fresh. They give supplies of 1½, 30, and 65 gallons per minute at depths of 27′, 28′, and 70′ respectively. In all cases the water rises 2′ above the surface of the ground. No investigation appears to have been made as to the manner in which the water is obtained, or the reason why the normal conditions with regard to the opening of the joints should be departed from.

SWEDEN.

A successful well was sunk in granite on the island of Arche (lat. 58° 29′, long. 16° 58′ E.), and a supply of 3 gallons per minute was obtained at a depth of 100′, the water rising to within a few feet of the surface. This well is of interest in that a supply of fresh water was obtained on an island at some distance from the mainland which could not have been derived from the island itself. Six other successful wells are also reported at depths varying from 110′ to 120′.

CONCLUSION.

From the existing information several useful lessons may be learnt with regard to the water-bearing properties of crystalline rocks in general.

In the first place, it should be noticed that crystalline rocks frequently provide considerable quantities of water, and in new countries where water is scarce they should be looked upon as a possible and promising source of supply.

Secondly, it is not usually economical to drill more than 200′ after striking rock. If the well is unsuccessful, it is better to abandon it and start another well elsewhere in the neighbourhood.

Lastly, care should be taken to guard the ground in the neighbourhood of the well from possible sources of pollution.

REFERENCES.

U.S.A. Water Supply Papers No. 114 (1905), No. 145 (1905), No. 232 (1909).
J. A. Holmes, Trans. Am. Inst. Min. Eng. Oct., 1895.
Nordenskiold, Compt. Rend. Acad. Sci. Vol. 120, 1895, pp. 857—859.

Digitized by Google

GIBRALTAR UNDER MOOR, SPANIARD, AND BRITON.

(*Continued*).

By Col. E. R. Kenyon, R.E.

When North Africa was conquered by the Arabs or Saracens, the greatest and most powerful native race was that of the Berbers who long held out and who, when they finally yielded to the invaders and adopted the forms of Islam, never really amalgamated with them. They were a savage and warlike people who supplied useful soldiers to the Arab Emirs. Tarik, the conqueror of Gibraltar, was himself a Berber, and his army is thus described by Scott (Vol. I., p. 225) :— It "was one of the most motley forces which had ever been assembled under the Moslem standard. . . . The bulk of the troops was composed of Berbers, fierce savages of the Atlas Mountains, proselytes reclaimed from fetichism by the policy and eloquence of Musa. . . . Every nation whose type chance, misfortune, the love of plunder, or the spirit of adventure had impelled upon the African coast, was represented in the ranks of the invaders; descendants of the Vandals and the Goths; Bedouins from the Hedjaz; political exiles from the far Orient; conspirators from Syria; apostate Byzantines who had renounced allegiance to the Emperor of Constantinople; and a considerable body of Jews." The conquest was however effected under the orders of the Arab General, Musa, and on behalf of the Caliph, whose seat was at Damascus. It was therefore correctly considered as an Arab or Saracen conquest. In the division of the spoils "the bleak sterile plans of La Mancha, Aragon, and Galicia were assigned to the Berbers, while the Arabs of Syria and the Hedjaz divided among themselves the glorious regions of the South which tradition had designated as the Elysian fields of the ancients."* The history of the Mahomedans in Spain is largely made up of the incessant feuds between the highly cultured Arab race and the comparatively savage, but very warlike Africans or Moors. For nearly three centuries and a-half the Arabs retained the predominance, but then the Berber dynasty of the Almoravids ousted the Arab princes (1090), to be in their turn overthrown by another Berber line, the Almohades (1146). The first three princes of the Almohade line were pre-eminently conspicuous for their talents, their firmness, and their political sagacity. Their reigns . . . were neither oppressive nor unjust. . . . But so capricious and disloyal was the African, that neither the enjoyment of present favour nor the expectation of

* Scott, Vol. I., p. 325.

Digitized by Google

future benefit could ensure his fidelity. He was wholly careless of the advantages of civilization. His superstition made him the facile dupe of every impostor. The Almohade sovereigns lived in constant apprehension of dethronement. If they left Africa for Spain the desert tribes were certain to rebel. As soon as they had re-crossed the strait, Andalusia rose in arms. . . . The Berber element, while abhorred by the Arabs, had yet so permeated the society of the Peninsula that every department of government, every rank and profession of men, had been infected with its poison. Under such conditions political regeneration was impossible. No reformer, no conqueror, could avert the final catastrophe—a catastrophe inevitable in the decadence of nations,—subjection to a foreign enemy actuated by religious fanaticism, military ambition, and inflexibility of purpose. The victory of Alarcos (1195) was the closing triumph of Islam in the Peninsula."* For another three centuries the Moors maintained an ever-diminishing dominion in Spain. From 1266 they were confined to the kingdom of Granada. In 1309 the Spaniards of the kingdom of Castile captured Gibraltar, but after 24 years' possession they again lost it and never recovered it until 1462 when it was captured on August 20th (St. Bernard's Day) by Alonso de Arcos, Alcaide of Tarifa, taken possession of in the name of the Duke of Medina Sidonia, and unwillingly transferred by him to King Henry IV. of Castile. Never again has it passed out of Christian hands, but its possession was not finally confirmed to the Spanish Crown, instead of the Medina Sidonia family, until 1501 when the second duke transferred it under pressure to Queen Isabella, to whom Spain owes its union under a single monarch and its freedom from Moslem rule over any part of its soil.

GIBRALTAR UNDER THE SPANIARDS.

The distinctive traces still remaining of the Spanish rule in Gibraltar are not as numerous or as prominent as one might have expected. This is, no doubt, owing partly to the almost total destruction of the town during the great siege of 1779–83, and partly to the gradual growth of the British fortifications which have in many cases altered or obliterated those of Spanish construction; and even where old works remain they have been renamed, so that there is little or nothing to mark them out.

Probably the most ancient memorial of the Spanish conquest is furnished by the coat of arms which was granted by Queen Isabella to the fortress about 1502. The original grant is still preserved at San Roque with other archives removed from Gibraltar after the capitulation of 1704 and is printed at full length in Ayala's Appendix X. In this deed the arms are described as a red castle on a shield of which

* Scott, Vol. II., pp. 315—316.

Digitized by Google

the upper two-thirds are white and the lower third red, and from the castle there is pendant a golden key over the red field. The castle is separated from the red field by a white line.

The Churches.

In Spanish times the churches were very numerous, as may be seen from the various lists of those which were in existence in 1704, one of which was given by the Vicar Apostolic in the *Gibraltar Chronicle* of April 9th, 1868, and another, slightly different, in Colonel Dewing's pamphlet on the antiquities of Gibraltar. Of only three is there now any remnant, if we except the old archway which is to be seen in Southport Street in the west end of St. Jago's* Barracks. Fortunately the three remnants belong to three of the most ancient of the sacred edifices. One is the fragment of the Chapel of "Our Lady of Europa" already described; another is the "King's Chapel"; and the third is the Church of St. Mary the Crowned.

The King's Chapel.

The "King's Chapel" which is now the principal Garrison Church, and which adjoins Government House, was originally the chapel of a Franciscan monastery which Don F. M. Montero states (p. 277) was founded in 1480, and transferred in 1531 to a site granted by the notary of the Franciscan Chapter of Madrid for the construction of a good church and convent, provided that a chapel was allotted for the burial of himself and his family. After the capture of Gibraltar by the British this convent became the Governor's residence, which has in consequence been known from that day to this as "The Convent." The front patio, or courtyard, and the buildings round it are on the same general plan as in 1753,† but at that time the building on the north side of the patio, which now forms a fine ball room on the first floor with a supper room below, was a part of the nave of the chapel; while the main staircase of Government House occupies what was then the south transept. The west doorway has been built up but may still be seen in the coach-house. Adjoining it there is in the stables a fine doorway, exactly similar to that which may be seen in Southport Street built into the end wall of St. Jago's Barracks. This doorway leads into a series of bombproof shelters built against the side wall of the old nave, on a site which is shown on the plans of 1736 and 1753 as a courtyard. It is often said that the mutilation of the church and the conversion of part of it into a ball room took place immediately after the capture of the place in 1704; but this is negatived by the above facts. Colonel James, writing in 1771 and describing the place as it was when he left in 1755 makes no mention of any part having been cut off from the church; nor does Ayala (1782) although he

* An English corruption of "Santiago."
† This plan is in the R.E. Office.

Digitized by Google

expressly speaks of the building as being used by the English for divine service, and draws attention to the fact that the other churches were devoted "to profane uses," such as barracks, storehouses and the Admiral's residence. Major Hort* speaks of "a long and lofty chamber supported by two rows of pillars in which the Duke of Kent afterwards held his 'Governor's banquets' as having 'constituted in olden times a portion of the aisle.'" There can be no doubt that this is that part of the building, already mentioned, of which the ground floor is utilized as a supper room, while the upper floor forms the ball room. The *Travellers' Handbook* (1844) mentions it as a ball room. It is therefore clear that the mutilation of the chapel took place between 1782 and 1839; and we may reasonably conclude that it was effected after the siege of 1779–83, when, no doubt, extensive reconstruction must have been necessary. The old pay lists (now at the Record Office) show that a considerable amount of work was done at the Governor's residence between April, 1783, and May, 1784.

A Garrison Order of 19th December, 1788, says that "King's Chapel" will be opened for Divine Service on the following Sunday. There is however one passage which throws doubt on the conjecture that the severance was made during the repairs after this siege. The author of a satirical pamphlet,† written in order to attack a certain lieutenant-colonel who is described as a "deputed Deputy's Deputy," says "To repair the church, he pulls down one-half of it and with the materials built storehouses on the esplanade." This acting Governor was Colonel Kane who arrived in 1720; and from James‡ we learn that the "esplanade" was on the site of the Casemates Barracks and that it was cleared of rubbish in 1731. On this site once stood the parish church of the quarter of Villa Vieja, as we see from the following passage from Portillo, quoted by Ayala (p. 62):—"There is a most ancient hermitage, and it is in the Villa Vieja with the present name of Our Lady de la Cabeza. I have also heard the oldest inhabitants of this city call it Santiago, afterwards Santa Brigida, and lastly Our Lady de la Cabeza, and it was the ancient parish church." It seems possible that this was the church referred to in the satire, and that the doorway in St. Jago's Barracks and the similar one in the stables of Government House were removed from it, which were in the north corridor of the patio but had in 1844 been covered over by the plaster.

The Church of St. Mary the Crowned.

This is the Roman Catholic Cathedral of Gibraltar, and has an interesting memento of the transfer of the city to the Spanish Crown in the shape of a slab carved with the Royal Arms of Spain, which is now to be seen on the wall of the clock-tower inside the

* *The Rock*, 1839.
† "Reasons for giving up Gibraltar," 1749.
‡ Vol. II., p. 304.

Digitized by Google

little courtyard or patio of the church—a remnant of an ancient "Court of orange trees," dating from Moorish times, which was sacrificed early in the 19th century, the site being sold to the Government for £1,000 for the widening of the street.* In 1868 this was the only Roman Catholic Church "much smaller than in 1704.† A part of the sacred edifice is wanting, also the orange square"; and, from a comparison of the church with the plans of 1736 and 1735, it is evident that not only was the orange court destroyed, but also that about 30′ were cut off the west end of the building. Portillo‡ says "This church was apparently a Moorish mosque, as is shown by the building in the court of the oranges and by the work which we saw pulled down in the nave where now is the 'Altar of the Name of Jesus.' . . . and by the marbles in that court or cloister which are similar to those of the church of Cordova in colour, length, and thickness. The tradition is that the Catholic Sovereigns ordered it to be designed and built according to the commencement which has been made." James§ describes the court as "a Moorish square" round the sides of which are "Moorish pillars and arches that support a terrass entirely in the Moorish system of building." It is possible that this was the "principal mosque" built by Abu-l-Hasan but there is no proof of it. It appears that when the conversion of the building into a Christian church was initiated by Ferdinand and Isabella, a fine bell and clock-tower were built, and that the Royal Arms were carved on its north gate,‖ but during the siege of 1779-83 all spires and towers in the town were pulled down.¶ No doubt the slab on which the arms appeared was carefully preserved and was again built into an exterior wall of the church after the war was over, although not where it now is. It was removed into its present position from one nearly exactly opposite, a few years ago. The design of Ferdinand and Isabella (which probably incorporated the whole or part of the original mosque) was never completed, being suspended in order to provide funds for pictures and other decorations;** and it is evident, both from the letter of the Vicar Apostolic, already quoted, and from a comparison of the church as it now stands with Portillo's description, that it must have suffered other mutilations besides the reduction in size and loss of the orange court referred to by the Vicar Apostolic. No doubt, like every other building in Gibraltar, it suffered severely in

* Don F. M. Montero, p. 421.

† Letter from the Vicar Apostolic (Bishop Scandella) in the *Gibraltar Chronicle* of April 9th, 1868.

‡ Writing early in the 17th century and quoted by Ayala.

§ Vol. II., p. 351.

‖ Don F. M. Montero, p. 276.

¶ Spilsbury's diary, September 15th, 1779, and also Drinkwater's history.

** Portillo quoted by Ayala.

Digitized by Google

the siege. Probably very little of the original structure still survives. The existing clock-tower was built in 1820, except the cap and crown at the summit which were added in 1874 and 1906.

In addition to the three churches already described, namely (1) Our Lady of Europa, (2) The King's Chapel, and (3) St. Mary the Crowned, the following appear to have existed in 1704 :—

Ayala mentions: (4) The Church or Hermitage of S. Juan el Verde (p. 31), which belonged to the Knights of St. John of Malta and which owed its name of "the Green" to the colour of its roof tiles. Ayala describes it as standing among the gardens which adjoined the south end of the Red Sands; and the priests now resident in Gibraltar state that it was quite close to the old cemetery at Sandpits, which agrees well with Ayala's statement.* In Bishop Scandella's list however† the church is stated to have been "near the New Mole on the site of the present Navy houses"; and in the plan of 1738 the name of "Caleta de Juan Verd" is given to the coast line between Rosia Bay and the New Mole.

(5) Near to it was a Calvary with many crosses erected by Admiral Roque Centeno in 1623.

(6) The Monastery of Our Lady de la Merced (or, Pity). This was erected in 1587 as a hospital by a rich Spanish innkeeper named Juan Mateos. In 1591 it passed into clerical hands and its accommodation was increased to 400 beds (Hennen: p. 88).

(7) The Monastery of San Juan de Dios.

(8) The Nunnery of Santa Clara which was founded in 1587.‡ It was converted into a barrack between 1726 and 1746. The Cecil Hotel now occupies its site.§

(9) The Church of San Juan de Letran (or Lateran). Bishop Scandella states that this was "probably on the site of the present Grand Store" (*i.e.* the south-west end of Southport Street) and current tradition‖ is in accordance with this. There is however also a tradition recorded in the Gibraltar Directory that the site of the Grand Store was formerly a part of the grounds of the Franciscan convent and that the Armoury (now the Garrison Recreation Rooms) which was built in 1790 was erected on the old graveyard of that convent. Many skeletons, some of them with rosaries are said to have been dug up when the foundations were excavated. Probably the explanation is that San Juan de Lateran stood there and after it had disappeared tradition merged the site of the church in that of the adjoining more important one of the Franciscan convent. The plans of 1736 and 1753 seem to countenance such an explanation, for they

* Information given by Father Jones of the Christian Brothers.
† *Gibraltar Chronicle*, April 9th, 1868.
‡ Ayala, pp. 61 and 256.
§ Dewing.
‖ Father Jones.

Digitized by Google

show a lane (as at the present time) between the south wall of the convent grounds and the other site which is marked on the 1753 plan as "Inhabitants Garden"—a use to which the grounds of an independent church might very likely have been devoted.

(10) The ancient Parish Church of Villa Vieja.

(11) The Church of San Sebastian in the ward of the Barcina which is said by Ayala to have been "very ancient." Bishop Scandella sites it at "the Green Market where the Officers' Quarters now are" (*i.e.* the R.E. Mess).* It probably stood at the south end of the Green Market (now Cornwall Parade), for the 1736 plan shows a chapel on the site of the buildings at that spot (now the "Bristol Bar").

(12) The church of the "Confraternity of the True Cross" in the main street. It was converted into a barrack between 1726 and 1746. The site is that which is now occupied by the Café Universal as appears from a comparison of the Crown Lands Register with Bishop Scandella's letter in which he says it was "in the main street on site of Mr. Weir's present wine stores: the Government sold the buildings to Mr. Breciano," and with the 1736 plan which shows a chapel on the site now occupied by that café at the junction of Horse Barrack Lane with the main street. Probably it was from this building after its conversion into a barrack that the lane derived its name.

(13) "The Hermitage in the great square, where there is a hospital named 'de la Misericordia.'" Bishop Scandella says that it was probably on the site of the Club House Hotel (*i.e.* Connaught House, as it has been called ever since the Duke of Connaught occupied it in 1875-6). It was converted into a barrack between 1726 and 1746.

(14) The Hermitage of our Lady of the Rosary.

(15) The Hermitage of Los Remedios† which is stated by Bishop Scandella to have been on the site of the present Naval Hospital. It was converted into a barrack between 1726 and 1746.‡

In addition to the above Bishop Scandella records:—

(16) The Hermitage of St. Rose "on the site of the guardhouse at the entrance to St. Bernard's College."§

(17) A Calvary on the site of the residence of the Senior Naval Officer (*i.e.* the Mount). This Calvary, or Via Crucis, is no doubt the same as No. 5, the commencement being at the Red Sands and the termination at "The Mount" where there was a chapel which

* Colonel Dewing appears to have mistaken No. 9 for this church.

† Ayala, p. 53.

‡ Ayala quotes Portillo as his authority for the whole of the above list except Nos. 4, 5, and 15.

§ St. Bernard's College here means the house of the Little Sisters of the Poor, and the guardhouse is the disused one at the entrance to Engineer Road (Father Jones).

Digitized by Google

together with the 14 crosses, was under the care of the Knights of Malta who occupied San Juan el Verde.*

(18) Bishop Scandella also states that Father Jerome of the Concepcion in his work *Cadiz Ilustrada* (Amsterdam, 1690) adds the Church of Las Angustias, and (19) the Royal Chapel of Our Lady de la Piedad on the New Mole.

(20) James records a "Chapel of Christ," which is marked on his plan in Vol. II. and also in an undated and inaccurate French plan† at the junction of the roads to Europa and Windmill Hill about where the military school now stands, though the plans differ as to the side of the road on which it was.

(21) James also describes the house in which he himself lived as having formerly been a "Chapel of Ease." A comparison of his description with the 1736 and 1753 plans shows that the building referred to is the present Staff Quarter in Bomb-House Lane, opposite Bomb-House, though it is also clear that the structure of the building has been altered by the substitution of brick or stone and plaster for the "petrified sand charged with variety of shells that took a polish," which James describes. The building probably suffered in the great siege and, like the rest of the town, was rebuilt on the old plan but with other material.

(22) The plan of 1736 shows a chapel between Pitman's Alley and City Mill Lane, but its name cannot be identified unless it was one of those mentioned above whose sites are doubtful, namely, Nos. 9, 11 (for both of which however, probable sites have been suggested) or 18.

(23) Dodd states that the Goths built a chapel near the centre of the middle hill, but there is no trace of such a building and he does not cite his authority. Possibly this belief may have arisen from the fact that the Spaniards dedicated a tower at Signal Hill to "Our Lady of Guadelupe," so named from an image which was placed in it;‡ the shrine similarly dedicated in Estremadura being one of the most celebrated in Spain.

(24) It is sometimes stated that a convent dedicated to St. James stood on the site of St. Jago's Barracks. There is however no shadow of foundation for this belief. The doorway at the west end of the barracks is clearly not in its original position but has been brought there from elsewhere. The name of St. Jago (Santiago or St. James) as applied to these barracks is derived from the fortification now called "The Flat Bastion," the original name of which was "The Bastion of Santiago" under which title it is shown in a Spanish plan dated 1627.§ It was customary with the Spaniards to name their

* Father Jones.
† In the possession of Mr. A. Hasluck.
‡ Plan of 1627 in British Museum Add. MS. 15152.
§ British Museum Add. MS. 1552.

Digitized by Google

bastions and batteries after one or other of the saints, as, for instance, the batteries of St. Peter and St. Paul on the northern defences, where they were subsequently replaced by the improved works of Hesse's demi-bastion, etc.

The building at St. Jago's Barrack, into which the old doorway has been built, is shown on the 1736 plan as an armoury, and on that of 1753 (which shows a doorway at that spot) as a storehouse. Probably the presence of this doorway, combined with the survival of the name of St. Iago, led in course of time to the growth of a belief that the building had once been a chapel; and in the pay lists of 1786 and 1787,* we find mention of work done at "the Chapel Storehouse near Southport" which very probably refers to this building.

At these barracks there is an old graveyard which may have been formerly that of "La Turba," but the earliest tombstone is that of John Williams, Master Armourer, who died in 1738. The latest is dated 1815. Of course, as La Turba was the poorest quarter of the town, it is quite possible that there might have been earlier Spanish burials there without any permanent memorials having been erected.

From the Death of Isabella to the Capture by England.

When Queen Isabella died in 1504, she left a will in which she specially charged her successors never to alienate Gibraltar from the Crown. Her grandson, Charles I. of Spain (the Emperor Charles V. of Germany), showed himself not unmindful of the value of the place; and his connection with it is still commemorated by his Coat of Arms over the South Port (or New Gate as it was originally called), and by the name of "Charles V.'s Wall" which is applied to the south wall of the City and to the upper wall which carries on the fortification to Signal Hill running parallel to, but south of, the more ancient Moorish wall. The lower portion of this wall, namely, from South Bastion to the precipice above the town, was built by the Italian engineer, Juan Bautista Calvi, who was sent by Charles to attend to the fortifications of Gibraltar in 1552. He also rebuilt the Landport and constructed "a bastion defended by a broad ditch, there."† Perhaps this was on the site of Hesse's Demi-Bastion. The upper wall may perhaps have been planned by him, but it was not built until 1575 when Philip II. (Charles' son) sent another Italian engineer, El Fratino, who constructed this part of the wall and some additional bastions, one of which was that of Rosario, close to Southport.‡

To build this battery Ayala states (p. 251) that he had to destroy

* Record Office.
† Don F. M. Montero, p. 239.
‡ Don F. M. Montero, p. 241.

Digitized by Google

a very ancient Moorish gate called the "Gate of Algeciras" which had existed from the time of the conquest, and on which was sculptured the common Moorish emblem of the key (which one can still see at the Alhambra). Don F. M. Montero (p. 241) repeats this statement but in another place (p. 275) he speaks of this gate as having been in the same wall as, but above, the "New Gate." It seems probable that this latter is the more correct description, and that the old Moorish gate was at the site of the Flat Bastion, giving access to the ward of La Turba from the country, and that the New Gate or Southport was constructed to take its place.* The Rosario Bastion was so named from the hermitage of Our Lady of the Rosary which was close to it, and is shown on the plan of 1627 in Bell's translation of Ayala as being at about the site of the Ragged Staff guardroom.† Probably the Rosario Bastion is identical with that of the Ragged Staff flank.

James and Carter both speak of Charles V.'s Wall as having been built by the German engineer Speckel, but Carter probably used James as his authority; and James is far from being an accurate writer. Probably Speckel, who fortified Ulm, Strasburg, and many other places would have been consulted by Charles, and as he visited and studied the defences of many Italian fortresses it is very likely that, while he may have given or approved the general designs, the actual works were carried out by the Italians Calvi and El Fratino. The other bastions which are said‡ to have been constructed by El Fratino are Santa Cruz (now Jumper's) and King's Bastion. The *existing* King's Bastion, however, is an English work, having been built by General Boyd shortly before the great siege.

Another memento of the reign of Philip II. is given by "Cloister Ramp" at the south end of Irish Town, which preserves the memory of the Convent of "La Merced" or the Whitefriars, which was founded in 1581.§ This Convent became the residence of the British Admiral after the capture of 1704, and is shown on a plan of 1753 as "Naval Storehouse with Apartments for Officers and Clerks." It was ruined in the siege of 1789–93, after which the Admiralty bought "The Mount" for the quarters of the Senior Naval Officer; and the site of the old convent and its cloisters is now occupied by Messrs. Bland's premises.

A few years later than La Merced, the monastery of San Juan de Dios was founded.§ The site is now occupied by the Civil Hospital, which was formerly a Military Hospital, and previously the "Blue Barracks."

* To this New Gate the name of Puerta de Africa is given in the plans of 1627 in British Museum Add. MS. 15152.

† The plan is at the British Museum, and a copy is inserted in the Gibraltar Garrison Library's copy of Montero's history.

‡ *Gibraltar Directory.*

§ Ayala, p. 61.

Digitized by Google

The building known as "The Hermitage" at Rosia, recalls by its name the former existence of the hermitage of "Los Remedios" which stood on the site now occupied by the Naval Hospital; while the name Rosia, which is a British corruption of the Spanish word *rocio* or dew, recalls a little shrine dedicated to "Nuestra Señora de Rocio" which used to stand in front of the ladder leading down to Camp Bay.*

The son and grandson of Philip II., Philip III. (1598), who expelled the Moors from Spain, and Philip IV. (1621) are respectively commemorated by the Old and New Moles, which were built in their reigns.† They are now merged in the North and South Moles of the harbour, the Old Mole being defined by the remains of its English battery (to which the Spaniards gave the name of "The Devil's Tongue" because it proved such a scourge to their ships) and by the Boarding Station which stands on what was the head of the Mole. In Spanish times the Mole was 30′ shorter than under the English who added that length to it.‡ The New Mole is marked by the ancient breakwater forming its foundation and the old parapet wall standing on it.

Another interesting relic of Philip III.'s reign has been recently presented to the Garrison Library in the shape of two "Patteraras" recovered in 1905 from the remains of a sunken ship which is believed to have been one of the Spanish fleet which was sunk on April 25th, 1607, by the Dutch in an action fought close to the New Mole. In one of the guns there was still a stone shot and a charge of powder. The Spanish fleet consisted of 10 great galleons and 11 lesser war vessels under the command of Admiral Juan Alvarez D'Avila in the *San Agustin*, with a Vice-Admiral in the *Nuestra Senora de la Vega*, and a Rear-Admiral in the *Madre de Dios;* the Dutch fleet was composed of 26 small ships under Admiral van Heemskerk in the *Aeolus*, with Vice-Admiral Laurenz Alteros in the *Morning Star*, and Rear-Admiral "Pretty" Lambert in the *Tiger*.

The Spanish fleet was lying in the bay under the guns of the Rock and the Dutch approached them from the south-west corner of the bay, making their attack at about 3.30 p.m. By the first broadside fired on each side, Admiral van Heemskerk and Admiral D'Avila were killed. The battle continued till sunset, when the Spanish fleet was entirely destroyed, some of the vessels being burnt, some sunk, and some run ashore, and some 3,000 of their seamen killed; the Dutch lost no ship and only 100 men.§

An interesting description, with many plans, of the fortifications in

* Father Jones.
† Don F. M. Montero, pp. 246 and 250.
‡ Plan in *An Impartial Account of the late Famous Siege of Gibraltar*: 1728.
§ *Gibraltar Chronicle*, December 19th, 1908.

Digitized by Google

Philip IV.'s reign is contained in a MS. of 1627 in the British Museum.

Of the reign of Charles II., son of Philip IV., and last Spanish king of the Hapsburg family, there remain two relics. One is a large tablet in the King's Chapel to the memory of Doña Maria Ana de Moya Arnedo, the wife of Don Francisco de Angelo y Castro, general of the artillery of the Kingdom of Cordova and Governor of the city of Gibraltar. She died on 27th October, 1684, and (if the tablet is in its original position) is buried in the Chapel. The tablet also records her bequests to the Convent and to that of Our Lady of Mercedes (or Misericordias).

The second relic of this reign is the fountain which now stands in Castle Road. It formerly stood in the north-west corner of the Grand Parade (now called Commercial Square), whence it was removed in 1872. It was re-erected in its present position in 1886. In its original position it was the terminus of the aqueduct which supplied the town with water from the "Red Sands" and also the shipping by means of a branch pipe to the "Ragged Staff" wharf. The line of the aqueduct may be traced by the four small towers on the east side of the road to Rosia; and it still supplies water to the lower parts of the Alameda although no longer serviceable for drinking water. James (p. 307) gives 1694 as the date of the fountain, and Ayala (p. 250) gives 1571 as that of the aqueduct.

A curious episode of this reign must be narrated before we pass to the closing scene of the Spanish dominion. In 1693 when Louis XIV. was facing the coalition of England, Germany, Holland, and Spain formed against him by William III., the allied British and Dutch fleets under Sir George Rooke were defeated off Lagos on the south coast of Portugal by Admiral Tourville. Rooke took refuge under the Spanish guns of Gibraltar. The French pursued him and bombarded the place on June 12th for nine days, driving the inhabitants on to the Heights and compelling the nuns of Santa Clara to seek shelter in the hermitage of Our Lady of Europa.* This war was terminated by the Peace of Ryswick in 1697. Three years later Charles II. of Spain died; Philip V., grandson of Louis XIV., claimed the throne in accordance with the will of Charles II. and with the support of his grandfather; and the war of the Spanish Succession broke out. England supported the Austrian claimant—the Archduke Charles—against Philip, the first of the Bourbon dynasty, which, notwithstanding various interruptions, still rules over Spain. Gibraltar itself is a lasting memorial of this reign for in it the Rock became the prize of England, to whom its possession was confirmed by the Treaty of Utrecht which closed the war in 1713.

* Don F. M. Montero, p. 252.

(*To be continued*).

Digitized by Google

MAJOR-GENERAL SIR WILLIAM REID, R.E., G.C.M.G., K.C.B., F.R.S.

(*Continued*).

By Col. Robt. H. Vetch, c.b., late R.E.

We have followed the course of the intrepid soldier of many fights and many wounds returning home in his young days only to be slighted and ignored, and we have seen him, in his maturity, once more return from a campaign in Spain, where he had held high command, and had been again severely wounded. There he had been decorated by the Queen he had served. Here he was received with chilling neglect. He was indeed restored to full pay and his place in the Corps, as had been promised, but he was left unemployed.

In the months that followed his return from Spain in 1836, Reid perfected the work which had occupied his leisure time for so long. The publication of his book on the Laws of Storms proved a turning point in his career. The neglected soldier was warmly welcomed and highly honoured by the scientific world. He had now appealed to judges of large issues. The echoes of the applause of savants penetrated even to Government offices. He was recommended for reward. The man, who had been refused the military C.B. for his most distinguished services in war against the enemies of his country, was made a Companion of the Order of the Bath, in the Civil Division, for his services in the cause of humanity in general, and of seamen in particular, in fighting against the all-powerful elements of wind and water. Appropriately enough he was also planted down in the middle of the Atlantic Ocean and enthroned as Governor of the islands of hurricane notoriety, discovered by Juan Bermudas nearly four centuries ago.

The new Governor of the Bermudas left England in February, 1839, to take up his appointment. Accustomed, as we are in the present day, to hear of a Colonial Governor leaving for his seat of Government in a first-class liner, provided with ample accommodation and every luxury for himself, his family, and his staff, it is curious to compare the want of ceremony and the sort of vessel that was considered good enough for a Colonial Governor 70 years ago.

Colonel Reid embarked at Portsmouth with his family, which now consisted of six daughters, the youngest, Grace, having been born at Portsmouth on the 11th June in the preceding year. The voyage was made in a sailing ship, carrying a cargo of bricks, and named the *Barlow*. The captain was not so temperate as he should have been. He took two hours to get out to Spithead. There was no chronometer

Digitized by Google

on board, except Colonel Reid's watch. When they had been out for over six weeks, Reid came to the conclusion that they had passed the Bermuda Islands. He with difficulty persuaded the captain to put back. When he had done so it took them a fortnight more before they at length made Bermuda after a voyage of over two months. It is not surprising to learn that the ship was lost on her next voyage.

The Bermuda Islands are not, indeed, easy to find by an unskilled navigator. About 20 square miles of surface comprise a few large and innumerable small islands; the whole are surrounded by coral reefs, the deep sea outside varying in distance from the land from ½ mile, on the south, to 9 miles on the north; the land is generally low, and reaches its highest point at about 360′ and that only at one spot; it is difficult to see from any distance, and it is yet more difficult to get into harbour by the few available and intricate channels. It is said that when it has not been possible to see the islands from a vessel approaching them on the leeward side, their proximity has been made known by the fragrance of the odoriferous cedar trees with which they are covered.

Arriving in Bermuda in April, 1839, Reid remained there, with the exception of two occasions on which he took a few months' leave of absence, for nearly eight years, and left a name among its people which will never be forgotten. Here he found a new and open field for the exercise of his unbounded energies, while, as Governor, he was in a position to exercise those energies to the greatest advantage.

The coloured population, so lately freed from slavery, was without incentive to work and without the very rudiments of education. Reid established parochial schools throughout the colony and procured annual votes from the legislature for their support. Agriculture had been neglected. The chief implement used for tilling the soil was the hoe. Little was grown beyond arrowroot and onions, and the export trade in these was limited to the West Indies. Reid realized that, with its climatic conditions, Bermuda might be made a market garden for early potatoes and other vegetables for the United States. He set to work to train the people in an improved system of cultivation. He purchased the discharge of some soldiers of the garrison who were gardeners by trade, and employed them as instructors. He imported suitable agricultural implements, and introduced the best varieties of seeds. By holding shows of produce, and competitions in ploughing, mowing and sowing, he established a wholesome rivalry for the prizes which he presented, and stimulated the people to adopt an industry which is now their main support. He also started a public library.

After Colonel Reid had administered the Government for some years he recognized that, in the interest of traders, it was most desirable that larger vessels should be able to enter the harbours, and

Digitized by Google

that, to enable them to do so, the channels between the sea and the harbours through the reefs must be deepened and widened. He, therefore, proposed to accomplish this improvement by blowing up the coral rock at the sides and bottoms of these channels. In 1844, after carrying on a correspondence for some months, he was successful in obtaining the services of Corpl. Harris of the Royal Sappers and Miners. This non-commissioned officer was an expert diver of whom Reid knew, and had shown his capabilities when the Royal Mail steamer *Tay* arrived at Bermuda, having sustained some damage by running ashore on the Cuban coast. Corpl. Harris was employed to examine her. Supplied with a diving helmet and suit from the dockyard, he went down and found part of her cutwater and keel, and some 12′ of planking on her starboard side carried away. Forty-one times he dived in repairing the injury, and in three days so effectually finished his work that the vessel was enabled to return safely to England with the mails.

By orders from home, Corpl. Harris was attached, late in the year, to the department of the Naval Inspector of Works at Bermuda, for the purpose of removing by submarine mining the coral rock from the entrances of harbours. Working under Colonel Barry, the Commanding Royal Engineer, who had the superintendence of the work for the greater part of the time, he began with the ship channel leading into the harbour of St. George. Attention was confined at first to this channel, and the work was slow and laborious.

In the course of over three years all impediments to the navigation of this channel, to vessels drawing 20′ of water, were removed by the explosion of innumerable charges of gunpowder fired by voltaic electricity. By the time this work was finished Colonel Reid had left Bermuda for the West Indies. He was gratified to learn of the success of his proposal, when an account was forwarded to him at Barbados of a practical test of the improved condition of the channel; this had been made by H.M.S. *Growler*, of 1,200 tons, Capt. Hall, R.N., on the 26th February, 1848. The *Growler* steamed into the harbour against wind and tide, drawing slightly over 15′ of water. She effected the passage of this tortuous channel with ease and steadiness, having beneath her keel, when passing the worst part of the channel, at least 5′ of water.

Reid had been promoted to the rank of Regimental Lieutenant-Colonel on the 23rd November, 1841. In 1842 he took his family home for a few months during the hot weather returning to Bermuda in October. On the 11th May in the following year, his daughter, Sophia Lonsdale Reid, was married from Government House, Bermuda, to Lieut. (afterwards Colonel) G. W. Hallewell of the 20th Regiment of Foot. In 1845 Colonel Reid again went on leave of absence, and this time he took his family for a tour in the United States, Canada, and Nova Scotia.

Digitized by Google

In the following year Reid was offered the more important Government of the Windward Islands of the West Indies. He had to consider that if he accepted this offer he would have to be seconded in the Corps and, after a further prolonged absence from military duty, might not be able to return to it. But he had got into a groove that suited him, and into a larger field of service than he could find in regimental duty in times of peace and retrenchment; so he made up his mind to accept the offer and to take up the Government of the Windward Islands at the end of the year, when it would become vacant.

That the labours of Colonel Reid in Bermuda during his Government of eight years were neither unknown, nor unappreciated, may be gathered from an article, ascribed to the pen of the late Charles Dickens, that appeared on 31st August, 1850, in No. 23 of *Household Words*, of which he was editor. This article is entitled "The Good Governor," and the following extracts will give the reader some idea of the condition of the people of Bermuda when Reid arrived there in February, 1839, and what he did to improve it.

"In a region where favourable latitude and tempering sea breezes combine to produce perpetual summer, lie 'the still vexed Bermoothes,' the Bermuda of modern navigators, where one half of the year is the fitting seedtime for plants of the tropical, and the other half of the temperate zones. These islands discovered to us by a shipwreck, with one exception, our oldest colony, offer a miniature copy of the institutions of the parent state. . . .

"Formerly Bermuda, like Virginia, from which it was an offshoot, was a slave colony, and grew tobacco. But tobacco would not pay, and every Bermudian, being born within a mile of the water, was bred amphibious. Capital cedar for shipbuilding grows on the hills, and harbours are all around to receive the craft when built. So it came to pass that the 'Mudian clippers became plentiful all over the neighbouring seas, and took a large share of the carrying trade between our American Colonies and the West Indies. . . .

"There whales abounded in the neighbouring seas, and every 'Mudian took to handling the oar, the lance, or the harpoon, at a time of life when other children were driving hoops, or riding rocking-horses.

"It was the natural result of these handy occupations in so limited a space, that the whole population, with the exception of that supported by the expenditure of the garrison, was occupied in building, or rigging, or manning, or loading, vessels of some kind, if not whaling or fishing. White or black, they were all sailors and seafaring to a man, almost to a woman. The real mermaid still lingers round Bermuda's coast. Breechless babies swaggered along with a mixture of long and short steps in true jack-tar style. Bermudian young ladies directed their maids to let out a reef in a petticoat, and officers driving tandem were bid 'put yer helm down' by native guides.

"There are no records to show when first in Bermuda seafaring arts

Digitized by Google

began to devour all others; certain it is that just as the manufacture of glass and porcelain, purple dye, and other signal utilities and ornaments have been more than once discovered, lost, and rediscovered, so were agriculture and horticulture, in the year 1839 of the islands of perpetual spring, amongst the lost arts. . . .

"There were in that year two persons in the islands who could plough, but they did not. Haymaking and mowing was a theory learned in books, just as curious enquirers in Lancashire may have read of cotton cultivation. As for the state of gardening, it was about parallel with British gardening in the time of Queen Bess, who used to send to Holland for a salad.

"So there was neither corn nor hay, and very little fruit, of the worst quality. A sort of bitter orange tree abounded through the islands. Inquisitive strangers asked 'Why not graft, or bud, sweet oranges on these luxurious stocks, or why not sow sweet seeds?' But the natives were positive that the buds would not take, and seeds would not grow.

"Such was Bermuda in 1839; somewhat depressed in its fishing, whaling, shipbuilding, sea-carrying commerce, by the competition of New Brunswick, and the United States. Although less affected than the sugar-growing island by negro emancipation, still whites, who had lived easily, although barely, by hiring out a few black artisans, were reduced to sore straits.

"It was in this year there arrived a new Governor. He travelled the length and breadth of his islands, and found all green and all barren; a light but fertile soil, bearing fine timber, and luxuriant weeds. Round the Government House was a waste of eight acres, within sight a great swamp. . . .

"According to stereotyped precedent our Bermoothean Governor ought to have first sat down and written a flaming despatch home, painting the misery of the island, detailing his plans and asking for money. . . .

"But it happened that our 'Good' Governor, as he was afterwards called with good reason, was not a stereotyped Governor, so that the people he was sent to rule became happy and prosperous. He cared not to become either rich or famous. Therefore all his proceedings were on a humble, common-place scale. Seeing that the climate was admirably adapted for oranges; which, if of good quality, would afford a valuable export, he sent for slips and seeds of the best kinds.

"In front of Government House stands a bitter citron-tree; on this, with his own hands, he budded a sweet orange. The bud, contrary to Bermudian opinions, sprouted and grew, and flourished. After the living example of the Governor's tree, it became a fashion—a rage—to bud sweet oranges; so by this simple and short cut a horticultural revolution was effected. Still working out the maxim that example is better than precept, our Good Governor beat up for gardener recruits, accepting those who knew, as well as those who knew nothing but were willing to learn. With their aid, and at his own expense, the eight acres of waste round his residence, Mount Langton, were converted into a pleasure ground adorned with plants and shrubs of the tropical and

Digitized by Google

temperate zones, which he threw open freely to the inhabitants without distinction of colour.

"The next step was to drain the great marsh, the Langton Marsh, and grow hay upon it, so as to give the Bermudians a hint on the oddness of importing hay, while fine grass land lay waste. Two men who could plough were discovered, and pupils put under their hands; at the same time ploughs were imported. Having, out of his own pocket, offered prizes for garden flowers and vegetables, for corn and hay, for the best ploughman, and the best scytheman, the performances of these two being as wonderful to these islanders as skating to an Indian Prince, or wine-making to a Yorkshireman, the Local Parliament willingly voted other prizes for the same purpose.

"It would take up too much time to detail all the Good Governor's efforts—by example, by instruction, by rewards, by distribution of books, and by the promotion of industrial schools to educate the rising generation of Bermuda in useful civilizing arts.

"A grand holiday held in May, 1846, showed that these efforts had not been without pleasant and practical results.

"Mount Langton and all the pleasure grounds created under the personal inspection and at the expense of the Good Governor, were crowded with a noisy happy population, of all ranks, all ages, and all colours, black, white, and brown, assembled to enjoy and celebrate the taking stock of the revived industry of the island. . . .

"The Queen's representative did not grudge to give up for the occasion his private domain, as that was the best site in the island. Amid the luxuriant shrubs and gorgeous tropical flowers, the gay groups wandered; sweetly the sounds of the regimental band intermingled with the shouts and whip crackings of the contending ploughmen, as they turned up the brown furrows of long-neglected soil, and with the switching of twenty-five scythemen, exhibiting their newly-acquired skill on the drained pasture of Langton Marsh. Below lay the shipping in harbour, and far beyond the golden, purple ocean was dotted over with the cloud-like canvas of the famous 'Mudian craft. Almost at once—one glance—it was possible to take in a view of the pursuits of old and young Bermuda. . . .

"In due time, after the ploughing and mowing matches, came the competition in turnips, strawberries, potatoes, dahlias, barley, pot herbs, flax and cabbages, and the parading and comparison of horse-colts, ass-colts, calves, heifers, bulls, sows, and boars.

o o o o o

"Years have elapsed since the day of this well-remembered *fête*. But the Good Governor is still affectionately remembered. The Bermudians love to show passing strangers the sweet orange tree on Mount Langton, which still blooms a green and golden monument of plain, practical, and kind-hearted common sense. . . . If we would do good we must not be content with mere talk; we must not disdain to commence at our own doors by budding—a sweet orange on a bitter citron."

In December, 1846, amidst the affectionate congratulations of the

Digitized by Google

whole population on his promotion and of the deepest regret at his departure, Colonel Reid and his family left Bermuda for Barbados, the seat of his new Government. Besides Barbados the islands of St. Lucia, St. Vincent, Grenada and Tobago were embraced within the Government of the Windward Islands.

In the West Indies, as in Bermuda, Reid devoted himself to the amelioration of the condition of the coloured race, but he did so in no spirit of sentimentalism. He realized that the black man had been but recently delivered from slavery, and that it was the bounden duty of the Government to do all that was possible to promote the welfare, mental, spiritual and material, of this formerly downtrodden race. The development of the resources of the islands he felt to be of great importance for the benefit of all—white or black, and he especially endeavoured to forward the cause of education and to promote temperance. By his firm and beneficent conduct of affairs he gained the confidence and goodwill of all classes of the communities which he governed. Whatever he took up he gave his mind to it, and was enthusiastically interested in it, although his emotions were strictly controlled; this enthusiasm he communicated to others. Among the distinguished visitors who, on coming to Barbados on business or pleasure, were, as a matter of course, invited to stay at Government House, was a young man who had distinguished himself in chemistry. George Fownes had taken a degree of Phil. Dr. at Giessen and, at the early age of 27, had been appointed Professor to the Pharmaceutical Society and, soon after, Professor at University College. He was Secretary to the Chemical Society and a few years before his visit to the West Indies had published a textbook of chemistry. Now the Governor had just started a school of practical chemistry at Barbados, and his mind was full of this school and the good he hoped it would do in the promotion of the higher branches of agriculture. His difficulty at that time was to get the sort of textbook of chemistry he wanted. He poured out his hopes and fears to the young professor, who had himself taken the Actonian prize for an "Essay on Chemistry" and gained the Agricultural Society's prize for his "Food of Plants." Here was just the man Reid wanted. Whom better could he apply to for advice? His enthusiasm fired the professor, and the end of it was that Dr. G. Fownes undertook to draw up a treatise on rudimentary chemistry for the use of this school.

Having drawn up the treatise Dr. Fownes presented the MS. to Colonel Reid. It was printed for the use of the Barbadian School of Practical Chemistry. It so happened that Reid, who was a great educationalist, had many years before discussed with Mr. Weale, the London publisher, the great advantage to the public of a series of cheap, popular treatises on scientific and technical subjects, but nothing had come of it. Reid now sent him Dr. Fownes's treatise on

Digitized by Google

rudimentary chemistry as a sample of the kind of book he wanted Mr. Weale to publish. It proved to be the parent of an extensive and very valuable series of rudimentary treatises on all manner of scientific and technical subjects, published by Mr. John Weale of Holborn in red covers under the name of *Weale's Rudimentary Treatises*. With characteristic modesty, when the first edition of the *Rudimentary Treatise on Chemistry* by Dr. Fownes,* was out of print, Reid insisted that the notice of the origin of the series, which will be found in that edition, should be suppressed in any further editions.

Reid's career as Governor of the Windward Islands was cut short after less than two years' administration under the following circumstances. He was directed by the Secretary for the Colonies to proceed from Barbados to St. Lucia to enquire into certain charges against the Chief Justice there, connected with the publication in a local journal of two ribald letters. The Governor executed the duties assigned to him, first, by a patient investigation, and then by exercising the power, with which the Secretary of State had entrusted him, of suspending the judge from his office if he found that he was the author of these letters. The proceedings of the Governor were approved. But after a short lapse of time this approval was practically reversed by the reinstatement of the Chief Justice through some latent influence at home. Reid felt that the dignity of his office was compromised, and he was not the man to allow himself to be thus treated. He had too much self-respect. This reinstatement of the offender by the Colonial Office he considered practically cancelled the approval he had received from that office of his proceedings in the case. He regarded it in the light of a reflection, not on Colonel Reid, but on the Governor. He at once sent in his resignation to the Queen. Colonel Torrens, who had originally brought the charges against the Chief Justice of St. Lucia, now demanded that they should be tried formally by some competent tribunal and declared to be either true or false. The Secretary of State was in a dilemma and hesitated what to do. He requested the Governor to reconsider his decision to resign. Colonel Reid firmly refused and insisted on being relieved. He left Barbados in the beginning of September, 1848, and arrived at home in the following month.

During Reid's stay in Barbados as Governor, another daughter was married from Government House. His second surviving daughter, Maria, was married on the 17th June, 1847, to Lieut. Edward George Hore, R.N., afterwards Captain and Naval Attaché to the Embassy in Paris.

Much regret was felt by the people in the Windward Islands at

* Dr. George Fownes died in 1849 at the early age of 34 years, see *Dictionary of National Biography*.

Digitized by Google

the premature departure of the Governor. He had come to them with a great reputation from Bermuda and had stayed sufficiently long for them to know and appreciate him. Flattering addresses from the Legislative Councils and Assemblies of the islands composing his Government, and from various other bodies were presented to him. On the 14th October, 1848, Lord Grey sent a despatch from Downing Street to Reid's successor in the Government of the Windward Islands in reference to these addresses, and wrote in high terms of appreciation of Reid's services.

It does not appear that any similar appreciation of Colonel Reid's services under the Colonial Office was sent to the Board of Ordnance, as was usually done when an officer of one of the Ordnance Corps had successfully served in another branch of the Public Service. It so happened, however, that a newspaper, containing a copy of the despatch, referred to above, from the Secretary of State to the new Governor of Barbados, came into the hands of Sir John Burgoyne. He sent it to the Master-General of the Ordnance with the following minute :—

"In justice to Lieut.-Colonel Reid I beg to forward this for the perusal of the Master-General.

"J.F.B.

"*25th January*, 1849."

A memorandum referring to this despatch and giving the above minute of the Inspector-General of Fortifications, is attached to Sir William Reid's Record of Service, but the newspaper cutting containing the despatch of the Secretary of State for the Colonies is not there.

On arriving home from the West Indies, Reid took his family to Cheltenham, and while staying there, his daughter, Elizabeth Oakley Reid, was married, on the 16th January, 1849, to the Rev. Charles Gore Gambier (1824—1891), son of Admiral Robert Fitzgerald Gambier (1791—1872), and nephew of James, 1st Baron Gambier, Admiral of the Fleet (1765—1817). From Cheltenham Reid moved to Baker Street in London, and in August, 1849, he was appointed to Woolwich as Commanding Royal Engineer.

It was on the 14th June in this year that H.R.H. Prince Albert, distributing the prizes at the Society of Arts, alluded to the proposed National British Exhibition to be held in 1851; and immediately afterwards a series of events happened which led to the enlargement of this National Exhibition of Manufactures into an Exhibition of the Works of Industry of all Nations. The idea once started received a great deal of encouragement from the Prince, and in October, 1849, the Lord Mayor of London presided at a meeting at the Mansion House, at which it was resolved that it was desirable a Royal Commission should be appointed to invest the undertaking with a National sanction, and to give the world the utmost confidence that

Digitized by Google

the prizes would be awarded impartially. The Government of the day consented.

On the 3rd January, 1850, a Royal Commission was appointed to carry out an Exhibition of the Works of Industry of all Nations, to be held in London in the following year. H.R.H. the Prince Consort was its President, and the Commission was composed of all classes of society: Peers, Privy Councillors, and representatives of Science, Art, and Manufactures. A small Executive Committee of which Mr. Robert Stephenson was Chairman had been at work for some time by the appointment of the Council of the Society of Arts. The members of this Committee, although confirmed by the Royal Commission, tendered their resignations, in consideration of the changed position of affairs. Mr. Robert Stephenson was appointed to a seat on the Royal Commission, and, on the recommendation of Mr. Labouchere (afterwards Lord Taunton), then President of the Board of Trade, Lieut.-Colonel Reid, Commanding Royal Engineer at Woolwich, was appointed Chairman of the Executive Committee in succession to Mr. R. Stephenson, by Royal Warrant dated 12th February, 1850. The other members of the Committee were Mr. Henry Cole, Mr. Charles Wentworth Dilke, Mr. F. Fuller, Mr G. Drew, and Mr. M. Digby Wyatt (Secretary). Messrs. Fuller and Drew were able to devote very little of their time to the service of the Committee and the principal part of the duties fell therefore on Colonel Reid, Mr. Cole, and Mr. Dilke. The duty of this Committee was "practically to carry into effect all the decisions of Her Majesty's Commissioners, and to exercise that continued watchfulness in every department, which was requisite in so vast an undertaking, and which could only be secured by the agency of persons constantly engaged in its management, and possessing authority to dispose of such questions of detail as could not be conveniently delayed for the consideration of the Commissioners."* Colonel Reid, as Chairman, was requested to attend all the meetings of the Royal Commission which he did. Sir Henry Cole, in his *Fifty Years of Public Service*, has a great deal to say about the Chairman of the Executive Committee. As to Reid's appointment he says:—

"Writing now, thirty years and more after the event, I wish to record that this was a prudent and successful appointment, and that no better could have been made for the particular duty, which was chiefly to keep in order the various influences which had helped to produce the Exhibition. . . ."

In another place he writes:—

"He was a brave soldier, and had much more than a mere soldier's sense of implicit duty. He was a man of great caution, and yet

* Extract from First Report of the Commissioners for the Exhibition of 1851.

Digitized by Google

determined self-will, especially when conscience acted on him. He was a man of science; he was a philanthropist with beneficent tendencies; he had instituted most useful works and exhibitions of industry in the West Indies; he fully believed in the superior abilities of his Corps, the Royal Engineers, and by introducing them to the work of the Exhibition did excellent service to it. He was very simple-minded, gentle, and with feelings of high honour, perhaps, a little bordering on severity at times. His principal work in the Exhibition was pouring oil on troubled water. Someone who knew him, wrote in a colonial newspaper:—

"'It was curious to see the enraged and frantic exhibitor (the foreigner particularly), swearing at the injustice and favouritism which had consigned his article to some obscure corner, or some bad light, or some other fancied disadvantage, pass into the presence of the Chairman of the Executive Committee, and presently emerge all cheerfulness and contentment. It almost seemed as if he had passed through some talismanic process to have undergone the change, but such was the wonderful tact and temper of the Chairman, that nobody ever left him otherwise than pleased and convinced that justice had been done to him.'

"I recollect his marble attitude towards an indignant maker of agricultural implements, a stalwart Quaker, who fiercely threatened to write to *The Times*, but was reduced to the submission of a child."

As Sir Henry Cole justly observes, Reid fully believed in the abilities of his brother officers; and for the employment at the Great Exhibition of the Industry of All Nations of 1851 of so large a number of officers of the Royal Engineers and of non-commissioned officers and men of the Royal Sappers & Miners, these Corps were entirely indebted to Colonel Reid. Receiving the cordial concurrence of his civil colleagues on the Executive Committee, he represented to Prince Albert and the Royal Commissioners the advantages of military co-operation in carrying out the subordinate details of the work. The Commission approved, and in September, 1850, Colonel Reid obtained the permission of the Board of Ordnance to the employment of a small detachment of Royal Sappers & Miners under Capt. H. Cunliffe Owen, R.E., to assist the Executive Committee. They were found so useful that in the course of the next two months two complete companies were added, the 5th and 22nd Royal Sappers & Miners, under the command respectively of Capt. Owen, who was appointed General Superintendent, and of Capt. Gibb, R.E., who was placed in charge of the Workmen Organization and of the Fire Department. Further a separate detachment, composed of details from other companies, under command of Lieut. G. M. Stopford, R.E., was added later, and Lieut. Stopford was appointed adjutant to the force of Royal Sappers & Miners employed.

Other officers were added to assist the Executive Committee in its multifarious duties, which were steadily becoming more and more

Digitized by Google

arduous, until some 17 officers and 200 non-commissioned officers and men were employed. The names of the officers, besides those already mentioned are :—

Capt. S. Westmacott, Superintendent of the Military and Naval Class.
Capt. J. B. Collinson, Superintendent of the British Side.
Lieut. E. W. Ward, Secretary of the Jury Department.
Lieut. C. Pasley, Assistant to General Superintendent.
Lieut. H. W. Tyler, Persian, Chinese, and Colonial Department.
Lieut. G. E. L. Walker, Civil Engineering and Architecture.
Lieut. G. H. Gordon, Correspondence.
2nd Lieut. E. F. Du Cane, Machinery.
2nd Lieut. W. Crossman, Allotment of Space.

Ensign Craster
Ensign Soady
Ensign Brownlow
Ensign Trevor
} Of the Hon. E.I. Company's Engineers with some N.C.O.'s and sappers and miners of the same service.

Among the many varied duties upon which the Sappers were employed was the drawing of plans on a large scale of the ground floor and galleries, showing the exhibits and all particulars necessary to find the way from one part of the Exhibition to another. These were displayed at the points where they would be of most convenience to visitors. Referring to the Sappers who made these detailed and general plans, *The Times* of the 2nd July, 1851, says :—

"The training which, under Sir Charles Pasley's system, they undergo, admirably prepares them for this description of work, and they have brought to it the practical experience acquired during the Irish, Scotch, and English surveys, which, it will be recollected they were employed upon in compliance with a most valuable suggestion to that effect made by Colonel Reid. The plan to which we allude is a highly creditable specimen of the skill to which the Sappers have attained in the art of surveying."

Opposition was raised in *The Times* newspaper and in the House of Commons to the proposed site of the Exhibition building in Hyde Park. Prince Albert was much worried about it, and let it be known that if the site selected was not affirmed he was prepared to give up the Exhibition. Mr. Cole took the most active measures in support of the site selected. He canvassed for signatures to the petition that had been drawn up protesting against any change in the site; he personally investigated the question of damage by depreciation in value of the houses overlooking the Park, of which a great deal had been said; and he used all his energy and powers of persuasion to further the acceptance of the Park site.

It is not difficult to understand that this fussy, enthusiastic advocacy

Digitized by Google

of the Commission's choice by a member of the Executive Committee was very distasteful to the Chairman, and Cole naïvely, because unconsciously, lets his readers see that it was so in the following quotation from his (Cole's) diary :—

"*5th July*, 1850.—J. Bell, the sculptor, called to hear fate of division on the site. 162 for to 47 against. Palace Yard; Reid (who had the boldness of a lion with the timidity of a hare) said to me, 'Henceforth we must not be the focus of any agitation. Committees must not be asked by *us* to support the Commission about site or anything else. Mayors of Birmingham or Bradford must do it.'"

The trees both old and young on the site in the Park gave a good deal of trouble, as the Office of Woods and Forests would not allow them on any account to be felled. Cole says :—

"On the 22nd February, 1851, the young trees, worth, as Paxton says, about five shillings each, projected through the stairs. I requested Colonel Reid to see two stumps in the way, but, like Nelson, who would not see signals at the Battle of the Nile (Copenhagen?) he declined to see them, 'in case they should be removed.'"

Two days later these stumps were removed. As time wore on there was some anxiety as to whether the building would be ready by the 1st May, the day fixed for the opening by the Queen in person. Cole says :—

"On the 27th February it appeared obvious that the painting would not be completed by the 1st May. Colonel Reid with Mrs. Reid came, and I called the Colonel's attention to the slow progress of the painting. It was simply a question of numbers of painters and scaffolding. Mrs. Reid valiantly urged her husband to recommend that an extra £1,000 should be offered to Fox & Henderson for speed. I found out from Mr. Fox that he could and *would* hasten the work if paid £1,000 extra. Lord Granville and Mr. Cubitt agreed that he should be tempted by the bribe. Mr. Fox hastened the work, but, I am happy to record, flinched from taking the money, and afterwards told me that he could not take it. On the 20th March the painters were vigorously at work painting with plenty of scaffolding. Again I note, 7th April, 'Painting and removal of scaffolding very behindhand; wrote to Fox & Henderson and told Mr. Fox that the painters *must* be out by the 14th April, or the Sappers would enter, take away the scaffolding and turn men out.' 12th April 'Scaffolding not yet out,' but it was all down before the 30th April."

The Prince Consort was a frequent visitor to the Exhibition while it was building and sometimes the Queen accompanied him. On these occasions Colonel Reid was generally in attendance, or one of the other members of the Executive Committee.

The Great Exhibition was opened with pomp and State by the Queen in person on the 1st May, and remained open to the public until Saturday, 11th October, 1851. A few days after it was closed

Digitized by Google

Lord Canning reported the Juries' decisions. Lord Granville offered to Colonel Reid in acknowledgment of his services an honorarium of £3,000 which he declined. Lord Granville also told him that the Knight Commandership of the Order of the Bath was to be bestowed upon him by the Queen. Reid was gazetted a K.C.B. of the Civil Division on the 25th October, 1851, and two days later was appointed Governor of Malta.

"It has been said," writes Lefroy in the *Proceedings of the Royal Society*, "that Reid's singular simplicity of manner and total absence of pretension caused the distinguished men with whom he was associated on that occasion (the Great Exhibition of 1851), to wonder at first what had led to his selection for the office. They soon discovered under that simplicity, the patient but genuine enthusiasm, the varied experience, the calm and even temper, and the devotion to the duties of the moment, whatever they might be, which eminently fitted him for it.

"It is not too much to say that his judicious arrangements contributed materially to the success of that great undertaking, and they were fitly rewarded by the ribbon of the K.C.B. and his appointment to the important military command of Malta. It may be remarked that the Exhibition was on the eve of being closed when the same Minister (Earl Grey), who had to lay Colonel Reid's resignation before the Sovereign on the ground of his having been badly used, now submitted to his Royal Mistress that he should be entrusted with the Government of Malta."

On leaving the Exhibition to take up the Government of Malta the command of the Corps at the Exhibition devolved on Capt. H. C. Owen. Sir William Reid in bidding farewell to the men said :— "I have the most perfect confidence that you will continue to the end of this service to perform your duties with the same zeal which you have hitherto invariably shown, and with the same considerate and forbearing conduct towards all with whom you have been connected in this arduous undertaking."

The crowning testimony to the useful services of the officers of Royal Engineers and the non-commissioned officers and men of the Royal Sappers & Miners employed at the Great Exhibition, under Sir William Reid, was graciously given by H.R.H. Prince Albert, as President of the Royal Commission, in a letter to the Marquess of Anglesey, the Master-General of the Ordnance. In promulgating this letter, a copy of which follows, his lordship expressed his confidence that this high testimonial in approbation of the valuable services of those immediately concerned, would be received with feelings of pride and gratitude by the whole Corps of Ordnance.

"WINDSOR CASTLE, *29th October*, 1851.

"MY LORD,

"I have the honour, as President of the Royal Commission for the Exhibition of 1851, to convey to your lordship, both in my own name, and in that of the Commission, our thanks for the cordial aid you lent

Digitized by Google

us in allowing several officers of the Corps of Royal Engineers, and two companies of Royal Sappers & Miners to assist the Executive Committee in the arrangement and management of the Exhibition.

"Her Majesty's Commissioners consider it due to the officers of Royal Engineers, and to the non-commissioned officers and privates of the Royal Sappers & Miners, who have been thus employed, to express to your lordship, in strong terms, the sense they entertain of the admirable conduct of the whole body while engaged in this novel, delicate, and responsible duty.

"The officers of Engineers have, in the able assistance rendered by them, afforded another instance of the useful manner in which a military body may be employed in civil services during a time of peace.

"The Royal Commissioners, being desirous of marking their sense of the share which the different persons employed in connexion with the Exhibition have had in bringing it to a successful issue, have requested the various civilians so employed to accept a certain sum of money in recognition of their services. We have ascertained from Colonel Reid that such a course would not be agreeable to the feelings of the Engineer officers, who have similarly given their assistance, and to whom we could have wished to offer a similar token.

"With regard to the non-commissioned officers and privates it gives me much pleasure to state, that at the period of preliminary arrangements when the labour required was sometimes excessive, their exertions were always cheerfully made. During the course of the Exhibition, they practically demonstrated the great value of their schools of instruction by the many useful plans which they drew; and by carefully acting always in subordination to the civil police force, they established for themselves a character for good conduct and attention to the exhibitors and visitors, greatly to the credit of the Corps to which they belong.

"The Royal Commissioners have therefore thought fit to award a sum of £600 to be laid out either in drawing or mathematical instruments, or in other suitable lasting memorial of their connection with the Exhibition, for the non-commissioned officers and privates of the Royal Sappers & Miners, to be distributed by the officers in such manner as your lordship and the Inspector-General of Fortifications may approve; and we trust that you will give your sanction to the acceptance of these testimonials of their good conduct.

"I have, etc.,
"ALBERT,
"*President, Royal Commission.*

"FIELD MARSHAL THE MARQUESS
OF ANGLESEY,
"Master-General of the Ordnance."

While employed on the work of the Great Exhibition of 1851, Colonel Reid had resided at Kensington Gore, and it was about this time that Mrs. Reid pathetically made a list of the many places she had lived in since her marriage, and the frequent moves necessi-

Digitized by Google

tated by her husband's appointments. She says at the end of the list, "This exactly averages one general move a year for 31 years, because it makes 33 moves, of which two only were made when I had a home, and did not need to remove bag and baggage, *i.e.*, the journey to England in 1842, and the journey to the United States in 1845, each from and returning to Bermuda. A gentleman, I knew, left the Army because he had packed up his toothbrush 14 times in one year, and therefore this is not an average for H.M. Service in the Line, at all, either in number of moves, or difficulty."

Colonel Reid was gazetted to the Government of Malta on the 27th October, 1851, and the following month left England for the Mediterranean.

The Executive Committee of the Great Exhibition of 1851 was dissolved in April, 1852, when H.R.H. the Prince Consort wrote to inform Sir William Reid and to thank him in the name of the Commissioners for his services as Chairman of that Committee :—

"*From H.R.H. the Chairman of the Royal Commission for the Great Exhibition,*

"*To H.E. Colonel Sir William Reid, Governor and Commander-in-Chief, Malta.*

"BUCKINGHAM PALACE,

"*28th April*, 1852.

"SIR,

"I have the honour to acquaint you that Her Majesty's Commissioners for the Exhibition of 1851 adopted a minute at their meeting on the 24th inst., to the effect that as the executive labours of the Commission with respect to the carrying out of the Exhibition might be looked upon as terminated with the presentation of the report to Her Majesty, the present executive staff should be discontinued.

"In communicating to you the above resolution of the Commissioners, it affords me much satisfaction to be the medium of conveying to you the assurance of the high sense entertained by us of the eminently zealous and efficient services rendered by you in your capacity of Chairman of the Executive Committee, in whose labours you bore so large a share until the period of your departure from England as Governor of Malta.

"The Commissioners fully appreciate the zealous and unremitting exertions of the acting members of the Executive Committee to which the success of the Exhibition is mainly owing, and they feel that they are much indebted for the harmony and good feeling that has prevailed in the execution of the duties assigned to the different officers of the Commission, to the conciliatory yet firm manner in which you at all times exercised the authority entrusted to you as Chairman of that Committee.

"Very faithfully yours,

"ALBERT."

Digitized by Google

MEMOIRS

MAJOR-GENERAL EDWARD RENOUARD JAMES, ROYAL ENGINEERS.

(Continued).

By COL. ROBT. H. VETCH, C.B., LATE R.E.

We have seen that, after his release from captivity, James travelled to Malta from Constantinople in the s.s. *Emperor* with several brother officers of the Corps, among whom was Major Stanton who was on his way home. This officer had been promoted Brevet Lieut.-Colonel, and during the peace negotiations had been appointed the British Commissioner for the delimitation of the new boundary between Russia and Moldavia, consequent on the cession by Russia to the new State of Roumania of a portion of Bessarabia. Lieut.-Colonel Stanton having returned to the Crimea, James applied to him for the post of assistant to the Commissioner, of which there were to be two. That he had travelled in Russia and had learnt to speak French was in his favour; and what was, perhaps, more important still, he was an adept at topography and had shown how good a draughtsman he was in the plans he had prepared of the Sebastopol siege operations. His 1″ to a mile coloured plan of the whole operations and of the country west of the Tchernaia River to the sea is a very pretty bit of work. He and his friend Charlie Gordon were appointed Colonel Stanton's two assistants and sailed for Constantinople with him in the transport *Kangaroo* on the 16th May.

Of Colonel Stanton James says:

"No more fitting selection could have been made to represent England, as he possessed great ability and sound sense, and, in addition to these very necessary qualifications, was gifted with a handsome face and figure, and an especially prepossessing manner."

Of Gordon he writes:

"Only six months my junior in the Army we had been intimate friends at Woolwich and ever since. With his absolute sincerity and bright winning way, no one who knew him as well as I did could help loving him.

Digitized by Google

He had already gained a reputation in our Corps for his extraordinary energy; at the Siege of Sebastopol, where he was employed at the Left Attack, there was not a day on which he did not go to the trenches—as an amateur, if he could not do so in the course of his duty. As a young man his constitution was of iron, and although he had exposed himself recklessly from first to last, his health had not suffered in the smallest degree. His ability as a student at the Academy had not been remarkable, although he succeeded in gaining his commission in the Royal Engineers, an object on which he had set his mind to please his father, General Gordon of the Royal Artillery, rather than to store his memory with knowledge, in his opinion of doubtful use in his future career. And we, who knew Charlie so well, soon learnt to recognize in his character, in the firmness of purpose he displayed in conquering this first obstacle, an earnest of his indomitable will in all he undertook; and we felt certain that he only needed opportunities to gain a brilliant reputation. But we could not help seeing that there was no little danger that he might mar his fortune by the obstinacy of his strong will."

The British Commissioner only remained in Constantinople to receive his instructions from the English Ambassador, the famous Eltchi, Sir Stratford de Redcliffe. Meanwhile James and Gordon occupied themselves in getting the necessary equipment for the work before them. The English section of the Commission went by water to the Sulina mouth of the Danube, and up that branch to Galatz, where they stayed to provide themselves with travelling carriages (britschkas) and a "fura," or wagon, to carry camp equipage, luggage, etc. For the four sappers, the interpreter, the Greek cook, servants and grooms who accompanied them, local vehicles were requisitioned as required. The Commission was to meet at Bolgrad, the centre of the new frontier line, about 50 miles from Galatz and the British party arrived there on the 8th June.

James describes the Commissioners and their assistants. There was General Fanton de Verrayon, the Russian, who was assisted by Colonel Stackelberg. The General was a handsome man with a pleasant word and a courteous smile, always in uniform, and a pattern of neatness. He was a trained diplomatist. His assistant was a blunt and taciturn soldier of rather brusque manners. The Turkish representative, Dervisch Pacha, was a clever man with a fine military record, a poor diplomatist, indolent and apathetic, and quite satisfied to allow the other Commissioners to settle matters. Prince Stourdza of Roumania represented that new State. He was a fine handsome man with the most genial manner and, being fond of sport, was liked personally by the Englishmen, but he was a mere tool in the hands of the Russian.

The Austrian Commissioner was Colonel Count Kalik, and his senior assistant, Capt. Count Wimpfen. Both were men for whom

Digitized by Google

the English Commission entertained the highest respect, and with whom their intercourse was of the pleasantest kind. Men of breadth of view, which comes from culture and education, open and straightforward, they were also manly, and good sportsmen. Count Kalik was a fine soldier who fell in the Slesvig-Holstein War of 1864. Count Wimpfen was a nobleman of a very good family and was gifted with the highest abilities, a charming companion and an admirer of the English, with whose language and literature he was thoroughly acquainted.

Finally there was Colonel Besson, the French Commissioner, a splendid old soldier, who had risen from the ranks and nothing more. He invariably sided with the English. He had no assistant and, with great tact, Stanton invited him to become a member of the English Mess during the Commission. As he did not speak English this close companionship made it incumbent on James and his brother officers to speak French continually, much to their benefit, as the work of the Commission was carried on in French. Colonel Besson was vivacious and genial with all the bonhomie of a Frenchman, and was never out of temper. James says: "He afterwards served in the campaign of North Italy, in 1859, as Chief of the Staff of a French Corps, and commanded a brigade during the Franco-German War of 1870. Taken prisoner at Sedan he was interned in Germany until the end of the war, and at that time Gordon and I used to send him copies of the *Times* newspaper, in which he declared he could find better reports of the progress of the war than in any of the French papers." He lost his life at Paris in the operations against the Communists. His soldier servant was invaluable to the English Mess as their caterer and Mess waiter, and with their Greek cook, Francesco, who could "make raised pies worthy of the luncheon table of the Rag," the English Commission fared very well.

The Commission was given excellent quarters in the houses of the peasantry in all the villages where it halted and rarely was under the necessity of using tents to sleep in, though the marquee was used for sitting in during the day, and for the Mess.

Among the Russian subordinates of the Commission there were several young officers with whom James and Gordon daily came into contact in the course of the surveying operations on the frontier. Two of these, Lieuts. Ogranovitch and Effimovsky, they became intimate with, and saw more of them later. Another very young Russian officer was attached to the British Commissioner personally, and was in command of the small detachment of Cossacks which acted as his escort. He was a bright, lively boy, most willing to help, and proved of great assistance as an interpreter.

I do not propose to enter at any length into the work of the Commissioners. They travelled along the entire line of the new frontier

Digitized by Google

and discussed on the spot questions that arose, using a large scale Russian general map to be corrected later, if necessary, by the topographical officers in making the detailed survey. James made an excursion to the ancient fortress of Ismail on the shore of the Kilia Channel, stayed there two days, and made notes and sketches of the place. These were forwarded by Colonel Stanton to the Foreign Office, where they were deemed worthy of being laid before the Queen, and James was much gratified when Her Majesty's gracious approval of them was conveyed to him.

The Commissioners retraced their steps along the line of frontier to carry out the field-work. They then went to Kischenief in October, having completed the surveying operations in about two months' time. At Kischenief, the capital of Bessarabia, during the winter the plans and records were prepared. The Russian map that had been provided proved very accurate, and the insertion on it of the new boundary was an easy matter.

In carrying out the survey the topographical officers established pyramids at intervals to mark the line, and kept a *cahier de specification* to record the details. As each angle and bearing was recorded by the various topographical officers it became the subject of discussion. The English officers worked at first with a theodolite; the Russians used the plane table, and the Turks had an antique brass affair they called a *boussole*—a sort of rude azimuth table quite a century old, which they did not know how to use, and their work had to be ignored. The Russian officers were not instructed in the use of the theodolite, so the British officers put it aside after the first few days, and also used the plane table. While they marched up the Yalpoukh Valley plenty of time was found for shooting wild fowl.

During the winter at Kischenief the time of James and Gordon was very fully occupied. The plans to be drawn were about 35 in number, large and small, and they had to make three sets, one for the Foreign Office, one for the War Office and the third, through Colonel Stanton's amiability to Colonel Besson, who had no assistance from his Government, was for the French Foreign Office.

When most of the work of the Commission was finished and time could be spared, Prince Stourdza organized a grand *chasse au loup* 25 miles from Kischenief.

"We slept," says James, "at a village in the forest in the hilly district dividing the basins of the Dnieper and the Pruth, and reached the scene of the battue soon after daylight on a December morning, the snow on the ground being hard and crisp, and the trees covered with rime. All the inhabitants of the neighbouring villages acted as beaters, but 60 of them, who possessed single-barrelled flintlock guns, were allowed to join the shooters. The guns were extended along the margin of the forest, between 80 and 90 altogether.

Digitized by Google

"Most of the contingent from the Commission had double-barrelled pieces of the best construction, but in those days they were muzzle-loaders with nipples for percussion caps, the loading of these arms being rather a slow process, so that we had to nurse our charges. At first we were advised to load our right barrel with small shot and the left with slugs, in order to be prepared for whatever game might come. We were not allowed to speak loudly, and stood perfectly still under the trees for what seemed a long time, until at last the cries of the beaters and the distant cracking of boughs denoted that we might soon expect something to fire at. Some roe-deer appeared first, and eight soon fell. The hares came by hundreds, but we let most of them pass, as we did not wish to miss the chance of a wolf. . . . I am sorry that I did not get the chance of one, but Stanton was successful in killing two. Game of all sorts passed in rapid succession and for half an hour our excitement was immense. Then the beaters came up and all was over. We counted the bag and found it to be 5 wolves, 8 chevreuil, 9 foxes, 80 hares and a variety of birds. It was a very remarkable fact that the head of game which fell to the three British guns, exceeded that killed by the whole of the remaining guns. This is explained by our having quicker loading appliances, and also because we fired at whatever we saw on the move. The peasants with their single barrels, and in the desire not to waste their very precious cartridges, only aimed at fixed objects, and took a long time to reload. Their plan of killing a hare was peculiar, if not sportsmanlike; when running along a sudden 'whist' will cause the hare to stop and cock its ears to find out where the sound comes from, and while it is in this position the peasant makes a very careful pot shot. While they executed this feat, we often 'wiped their eye,' as the saying is, knocking the hare over as it ran, which was considered very unfair on our part."

Sleighing began in November and when the sky was clear and there was no wind and the frosty air was bright and crisp, no mode of travelling did the Commission find more pleasurable or less fatiguing, and trips were made in this way to verify work on the frontier. James kept a daily register of the temperature which fell below freezing point at night from November to March. On the 8th January, 1857, he noted a temperature at Kischenief at 8 a.m. of 6° below zero (Fahr.); at noon on the same day the maximum for the 24 hours preceding was 12° (Fahr.) or 20° below freezing point. While in summer on the 4th August, 1856, he registered a maximum in the shade of 93° (Fahr.).

During the winter the British Commission was enlivened by a two days' visit from W. H. Russell, the *Times* correspondent, who had been to the Coronation ceremonies at Moscow, and was returning home by way of Odessa and Bessarabia to gather information about the new boundary and the Austrian occupation of the Danubian provinces. They also attended in the spring some manœuvres of the Austrian troops at Jassy, on the invitation of the General Command-

Digitized by Google

ing. The journey to Jassy took two days to perform. James writes of this visit :—

"The snow had all melted and the wheels were replaced on our carriages; the weather was mild and the drive through the hilly, wooded country in Northern Bessarabia was very pleasurable. I recall an incident which happened on the road. In descending the steep hill down to the Pruth, it was necessary to put the iron shoe on the wheel of the carriage I was sharing with Gordon. At the bottom of the hill he got out to remove it, and not remembering that it must have become nearly red hot, he handled it incautiously, and burnt his hand so badly that I imagine he must have been scarred for life With his usual insouciance he made very little of the circumstance, though I am certain he suffered terrible pain, and the wound was not cured for some time. . . . We crossed the Pruth by a ferry. . . . We were given splendid quarters at Jassy and were hospitably entertained while there. . . . The manœuvres lasted three days. On our return to Kischenief we found little work left to be done. The Russian Commissioner raised difficulties to the very last, and succeeded in obtaining an important concession as compensation for having to give up Bolgrad, by gaining a small area near the Pruth at Kotomori. There is not much more to write about Kischenief. . . ."

The labours of the Commission came to an end in March, 1857, when the final documents were signed and ratified, and after an exchange of civilities the members dispersed.

Before James said good-bye to his colleagues on the European Russo-Turkish Boundary Commission at Kischenief, he heard of the death of his grandfather, General the Hon. W. H. Gardner, Colonel Commandant of the Royal Artillery, to whom reference has been made in the paper on the Fyers Family. "To him," says James, "I owed my nomination to Woolwich; and my sword, lost on being made a prisoner in the Crimea, was his present to me when I got my commission. He took a great interest in me, and I had sent him from time to time notes on the progress of the Crimean Campaign which he was very pleased to get. In the last years of his life he lived at Bishopsteignton, surrounded by his married daughters and their families. The Ponsonby Moores, in whose house he was; my mother at Exeter; and the Buckner family at Topsham."

James had no sooner done with one International Boundary Commission than he found himself attached to another. At the end of the Crimean War the Great Powers in the Conference of Paris determined that the time was opportune for delimitating the Asiatic boundary between Russia and Turkey. In the war with Turkey in 1828 Russia had annexed a large tract of Asiatic Turkey and also the Persian province of Erivan. These annexations had never been formally recognized, or, indeed, precisely defined. Wide areas of

Digitized by Google

country remained since the war of 1828 in a semi-lawless condition. The nomadic Kurds, especially those on the Ararat range, were able to defy the Governments of both Russia and Turkey. It was hoped by the delimitation of the boundary to make each sovereignty responsible for its own territory, and so put an end to this unsatisfactory state of affairs.

On finishing his work as British Commissioner on the Bessarabian Boundary Commission, Colonel Stanton had returned to England but his two assistants, Lieuts. James and Gordon, were directed to proceed to Constantinople to join the International Commission for the settlement of the boundary between Russia and Turkey in Asia Minor. Lieut.-Colonel (afterwards Field Marshal Sir) J. Lintorn Simmons had been appointed British Commissioner, and James and Gordon were attached to his staff. Travelling from Kischenief to Galatz by road, they embarked with their men in the Austrian Lloyd steamship, *Persia*, on the 19th April, 1857, for Constantinople arriving there two days later.

The party of the British Commissioner consisted of Lieuts. James, Gordon, and Helsham-Jones, R.E., for surveying duties; Capt. de Norman of the Foreign Office for clerical work, etc.; Assistant Surgeon Woodfull, R.A., medical officer; Messrs. Stabb (Hungarian) and Hidaiet (Pole), interpreters; Sergt. Fisher, R.E., and a party of 10 sappers, which included those employed in Bessarabia; Stauri, head servant and mess-waiter; Francesco, the Greek cook, who had been with the Bessarabian Commission; and a number of servants, syces, muleteers, etc.

The British Commissioner, Lieut.-Colonel J. L. A. Simmons, R.E., had distinguished himself in the recent war as the Chief Staff Officer of the Turkish Commander-in-Chief, Omar Pasha, first on the Danube, and afterwards at Eupatoria and Kertch, and more recently in the campaign in Mingrelia, where the victory of Indour was credited mainly to him. The Turkish soldiers would have followed him anywhere and fondly nicknamed him Kizil Bash from the ample red beard worn by him.

Capt. de Norman was a genial and intelligent comrade much liked by his companions. He ended his life a few years later in the saddest way, having been tortured to death as a prisoner in the hands of the Chinese, during the Anglo-French Expedition to Pekin in 1860.

The medical officer, Capt. Woodfull, was an invaluable member of the party, not only on account of his great professional skill, but also because of his cheerful disposition. "He was," says James, "a typical Mark Tapley, and I can never forget the way he brightened many a fatiguing march with his endless repertory of song and anecdote. He was never so tired that he could not sing at the top of his voice, and he seemed to know the music and words of every opera and every popular song."

Digitized by Google

Stabb and Hidaiet were good interpreters, the former having a competent knowledge of seven languages at least, and his English being very good. One of these languages was Armenian which made him most useful.

Having made all their preparations in Constantinople, buying horses and stores, and preparing camp equipage, the British section of the Commission left Constantinople on the 1st May in a dirty and uncomfortable Turkish coasting steamer, the *Kars*, which afforded the only means of getting to Trebizond, whence the march into the interior of Asia Minor was to begin. They arrived at Sinope on the 3rd and had time to land.

James writes of Sinope :—

"The little harbour, which is only open to the north-east, is sheltered from the north by a rocky hill, separated from the mainland by a low sandy neck, on which the ancient town lies. It has a singular interest, for many of the modern houses have the remains of Greek capitals and friezes embedded in their walls. On the west side of the town the place is defended by an old Genoese fort on rising ground. The anchorage in the bay is good for ships of light draft, and before the late war the sailing ships of the Turkish Navy lay there often. In 1853, the Turkish Squadron, which was anchored there under command of Muzafir Pasha (Admiral Slade), was attacked and destroyed by the Russian Fleet under Admiral Nachimoff. Scarcely any resistance was offered by the Turks, and nearly every ship was sunk. . . . The remains of the wrecked ships were still lying round the bay in all directions. The inhumanity of the Russians was much commented on at the time. It was alleged that Admiral Nachimoff was drunk, and that the crews of the sinking ships, struggling in the water were massacred unmercifully by his order. In the heated passion of war, such statements are sometimes made on insufficient evidence, and I should be sorry to believe this to be true. But I can say that I never heard a contradiction of it in Russia, though I was, more than once, told, as a good joke, how the Czar Nicholas had sent a pipe of wine as a present to Nachimoff after the battle. This Admiral was one of the most distinguished amongst the defenders of Sebastopol; he was killed at the Malakhoff, and we must try and ignore the accusation made against him of brutal inhumanity at Sinope."

Arriving at Trebizond on the 5th, the English Section disembarked and encamped outside the town. The transport beasts and private horses together numbered about 110, and with 30 individuals, besides muleteers in charge of contract pack animals, the camp was a large one.

The French Commissioner had already arrived. He was a brother of General Pelissier, the French Commander-in-Chief in the Crimea. He was old and rather infirm and unfitted for the arduous work and frequent exposure to be encountered. He had often to be carried in a litter. Sometimes he stopped in his quarters, while the Com-

Digitized by Google

mission was engaged surveying the frontier, but, although he spared himself in this way whenever possible, the hard life and the long marches affected his already shattered constitution so seriously that he survived the expedition only a few months. He had an able assistant in M. Sailliard of the French Diplomatic Service, who was young, active, clever, and accomplished, and, as he spoke English with fluency and was a good rider and a keen sportsman, he was a great acquisition to the society of the party.

The Turkish Commissioner, Hussein Pacha, arrived the next day, accompanied by Osman Bey, Suleiman Effendi, a large *entourage* of ragged followers, and a squadron of cavalry to act as escort. James says:—"We were on excellent terms with our Turkish colleagues, and they trusted Colonel Simmons especially, on account of the great reputation he had made for himself with their army.

After spending a few days at Trebizond to exchange formal visits with the other Commissioners, and to organize the Caravan, the party started on the 9th May on their journey through Asia Minor to the frontier, where they were to meet the Russian Section of the Commission. There were then no carriage roads in Asiatic Turkey and everything had to be carried on pack horses. "Our head muleteer," says James, "was a person of great importance, a solemn old Turk, but a very fine specimen of humanity; he was enlaced in gold embroidery and much beturbanned and armed. Riding a good horse covered with decorated saddlery, he smoked his long-stemmed pipe; he did not condescend to put his hand to any work, but gave orders to his men with the most perfect dignity.

"At the head of the train, as is customary, was an old horse which carried no load, whose duty it was to trace the path. Every caravan has such a leader, a very old horse who has traversed the caravan tracks backwards and forwards for many years. He is worth a high price for he has been sanctified by the blessings of the Mullahs. . . . Knowing by long experience every yard of the road and never making a false step his value, when a dangerous pass has to be crossed, is incalculable. The heavily laden horses behind him are roped from tail to head in a long string, and each in succession plants his feet into the marks left by the leader; when snow covers the track the foot-marks become hard, while the snow to the right and left of the path may be so soft that a wrong step may be fatal."

The British Section was provided with theodolites, sextants, transit instruments, mountain barometers, boiling-water thermometers, and they carried with them a large wheel, which was pushed along by a man on foot, and recorded the distances as they marched. The men took this duty in turn grumbling much at having to do it and christened the instrument the "plough."

But space will not admit of a detailed account of the march to Erzeroum. They got over the dreaded Zigana Pass 6,678′ above sea

Digitized by Google

level, without accident, but I extract from James's diary an itinerary which gives the bare particulars of the journey :—

Dates.	Stages.	Altitudes in Feet.	Distances in Miles.
1857.			
9 May	Trebizond to Djevislik.	330	18
10 ,,	Rested.		
11 ,,	Yelkupri.	4,190	14½
12 ,,	Over Zigana Pass	6,678	17½
	to Ardessa.	3,087	
13 ,,	Gümüsch Tchaneh.	3,626	15½
14 ,,	Khaleh.	4,915	16¾
15 ,,	Over Tchadrak Pass	5,847	16½
	to Balichor.	5,102	
16 ,,	Baiburt.	4,932	14½
17 ,,	Rested.		
18 ,,			
19 ,,	Massat.	5,262	20¾
20 ,,	Over Khoshabounar Pass	7,536	22
	to Khoshabounar.	6,429	
21 ,,	Potchik.	5,850	14
22 ,,	Erzeroum (camp outside town).	5,840	13
		Total miles ...	183

The altitudes calculated from the barometer readings and the distances measured with the surveying wheel.

During their stay at Erzeroum the officers enjoyed the genial hospitality of Mr. Hughes, the British Vice-Consul, who was a great Oriental scholar with considerable experience of Eastern life; while a marsh, on the plain near the camp, afforded them good sport.

On the 31st May the British Section moved on from Erzeroum to Kars and the following is the itinerary :—

Dates.	Stages.	Altitudes in Feet.	Distances in Miles.
1857.			
31 May	Erzeroum Camp over	5,840	
	Devèhbouinou Pass to	6,300	21¾
	Hassan Khaleh.	5,043	
1 June	Ardost.	4,900	26½
2 ,,	Yenikioi.	5,977	21½
3 ,,	Halted.		
4 ,,	Over Saghanli Dagh	7,533	24¼
	to Tcherpakli.	6,164	
5 ,,	Kars (Camp).	5,416	29½
		Total distance...	123½

Digitized by Google

The march on the 4th June was one of the most difficult made during the whole summer, being very up and down with few level intervals. James says:—"As we neared the two summits of the Saghanli Dagh, between which we were for a short distance on the slope of the Tchoruk Sou basin, the loose scoriæ, lava and obsidian which covered the surface of the track, made it most dangerous for the horses, and had they not been shod with flat plates of iron, in the Turkish manner, their feet inevitably must have been badly cut. Obsidian is a black stone with a sharp conchoidal fracture, and we might as well have marched among broken bottles. At the second summit, the higher of the two, we came again to the slope of the Caspian basin, which we did not leave for some months. The scene in itself was most dreary, but the distant view was magnificent. Our descent to the village of Tcherpakli, on the edge of the level plain of the Kars Tchai, was very rapid. The track followed the steep banks of a torrent, the horses sliding and stumbling along."

On the declaration of peace in 1856, Kars, the garrison of which had held out against an overwhelming Russian force under Mouravieff for over five months, in spite of much suffering from cholera, was restored to Turkey. It was at this siege that Major-General Sir W. F. Fenwick Williams of the Royal Artillery, nominally British Commissioner attached to the Turkish Army, but, by the influence he had gained, really the commander, so greatly distinguished himself. Helped by a handful of Englishmen—Colonel Lake, young Christopher Teesdale of the Artillery, Thomson and Sandwith, and by General Kmety, the Hungarian, Williams held out till the brave Turkish garrison was literally starving. When at last he capitulated Mouravieff, addressing him, said:—"You have made yourself a name in history, and posterity will stand amazed at the endurance, the courage, and the discipline which this siege has called forth in your army."

James and Gordon were left for a fortnight with their sappers in the camp outside the walls of Kars, while the British Commission, with Helsham-Jones and de Norman, went on to Alexandrapol to meet the Russian Section. Their orders were to make a survey of the town of Kars and especially of the outer forts and positions which had been the scene of the operations of the recent siege.

Leaving Kars on the 18th June they easily reached Alexandrapol or Gumri, only 32 miles distant, on the 20th. It was during this journey that James had his first view of Mounts Ararat and Alagos, the first, 80 miles away, and the second, half that distance; a signal proof of the wonderful clearness of the atmosphere in the region of the grand mountain, with which he was to be more intimately acquainted.

At Alexandrapol they were given quarters in a Russian house and, while the Commissioners were exchanging credentials, enjoyed the society of ladies for the first time since leaving Trebizond. They

Digitized by Google

made the acquaintance of the Russian Section, of which General Tcherikoff was the head and Colonel Ivanine his assistant. These officers seem to have reminded James of the Russian representatives on the Bessarabian boundary. Attached to the Commissioners was a large body of Cossacks of the Black Sea, to act as their escort on the Russian side of the frontier. It was commanded by Colonel Kratchefteski, "a jovial old soldier" who became a great favourite. Then there were the two topographical officers, Ogranovitch and Effimovsky, who had been with them in Bessarabia, and were greeted as old friends.

On the 24th June, 1857, the United Commission started down the course of the Arpa Tchai, which, for 45 miles to its junction with the Araxes, was the undisputed frontier line. James writes:—

"We had left the ordinary routes and the country was strikingly picturesque. Our first night's halt was at Baïndöur, 9 miles, and the second at Kazar Abat, 7 miles, and I remember how Gordon, near this place, displayed the fearlessness of his character in attacking a mountain bear, riding after it, and hacking at its head with his sword. The bear turned on him, and the incident might have ended seriously, if some of our party had not hastened to his assistance and driven the infuriated beast away.

"The third night's halt was at Kizil Kilissa, our camp being above the left bank of the river, at a height of 4,975'. We stopped an entire day there to explore the ruins of Ani, opposite where we lay. The last march had only been 8 miles, so that we were taking it very easy in comparison with the long days we had travelled in the journey from Trebizond to the frontier. . . . Our colleagues were not fond of hard work; a march of 10 miles was as much as could be endured without inconvenience; and fatigue, they thought, quite out of the question."

(*To be continued*).

Digitized by Google

Digitized by Google

Major Philip Cardew,
Royal Engineers.

Digitized by Google

*MAJOR PHILIP CARDEW, ROYAL ENGINEERS.**

I. Life and Character.

To attempt to sketch the character of Philip Cardew in a brief memoir must appear a useless task to those who knew him well, because his was a personality certain to remain for long clearly stamped on their memories; whilst it is peculiarly difficult to give an idea of his strong individuality, combined with a true underlying modesty of mind, to those who knew him not. He was descended from an ancient Cornish stock, and he himself associated with his Keltic ancestry his almost passionate love of the sea, together with a certain lack of "push," to use his own expression; whilst he also attributed certain less amiable characteristics, which in truth he did not possess, to the same source. His paternal great-grandfather, Dr. Cornelius Cardew, appears to have been a remarkable man, who rose no higher than the head mastership of Truro Grammar School, perhaps because of his hampering love of his native county. Cardew's grandfather was, like himself, an officer in the Royal Engineers, whilst his father served for some years in the 74th Highlanders. On his mother's side Cardew's ancestry was also that of a kind likely to stamp its mark on succeeding generations; for his grandfather was Lord Westbury, the famous Lord Chancellor, a man charming to meet in private life, but with a tongue capable of cruelly lashing an opponent. Such were Cardew's ancestors, and in his case, at all events, it is true that a man cannot be thoroughly known as long as his ancestry remain unknown.

Philip Cardew was born at Oxshott in Surrey on the 24th of September, 1851, whilst most of his youth was spent at Southsea and in a country house in that neighbourhood. A great deal of his time was, however, passed with his brothers on his father's yachts, the experience thus gained being undoubtedly a very valuable part of his

* Part I. compiled by Major L. Darwin from papers supplied by the family, from notes furnished by Sir W. Preece (concerning the work as a Consulting Engineer), Brigadier-General Wingfield-Stratford (concerning the episode at Sheerness), Mr. A. P. Trotter (concerning the Board of Trade), Major-General Ruck, and others. Part II. by Colonel G. A. Carr.

Digitized by Google

early education, the beneficial effects remaining with him for life. After a year or two at various preparatory schools, he was sent to Guildford Grammar School, where the education was mostly classical; and at the age of 15 he passed on to a crammer's, with the idea of working for Woolwich. Here he made remarkable progress in mathematics; for, starting from nearly complete ignorance, he had learnt more than any of his batch at Woolwich ever knew before he passed in first to the Academy in 1868 when not quite 17 years of age. Although one of the youngest of its members, Cardew maintained his positon at the head of his batch during the whole of the two years and a-half spent at Woolwich; and all felt that this was as it should be on account of the unquestionable superiority of his natural abilities. In these circumstances, and having served as senior responsible under officer, both the Pollock Medal and the sword of honour obviously fell to his lot. It may be worth noting that he considered that the stricter discipline and simpler life of the Woolwich of those days afforded a better training for the soldier than that now given in our military schools.

Cardew joined at Chatham early in 1871, his first commission being dated January 4th of that year, and he appears to have thought highly of the course of instruction given at the School of Military Engineering at that time, where two full years were passed. But here again it is possible that he would have said that his yachting experiences with the R.E. Club, "teaching readiness in resource, self-confidence, and habits of observation and carefulness" were equal in value to anything he learnt in the schools. Certain it is that this element in his life at Chatham bulked largely in his memories of those days, for he had never lost a chance, summer or winter, of a run with one of the three small yachts then kept. His interest in the club was long maintained, and it was due to him that in 1882 the *Buccaneer*, a larger yacht than any of those previously owned by the club, was bought, and remained their best boat for 14 years.

From Chatham Cardew was ordered to Bermuda, a station "unrivalled in its suitability for small boat sailing," where he became the owner of a 5-tonner, and an expert in local navigation. It was in 1876 at this station that we first hear of him in connection with the science of electricity, in the pursuit of which he was eventually to do his most notable work; for in that year he was placed in charge of the military telegraphs of that island, whilst in the following year he joined the Submarine Mining Service. Once started in this line of life his progress was rapid; for in 1878 he became the assistant instructor in submarine mining and telegraphy at the School of Military Engineering, whilst in 1883 he succeeded to the instructorship in electricity.

Without entering into technical details it is impossible to give any

Digitized by Google

idea of the value of Cardew's technical work in the Corps, an aspect of his life which is therefore best dealt with separately. Here it is sufficient to remark that what he had to do often had a practical side to it, nearly all the arrangements for the move of the Electrical School from the R.E. Institute to St. Mary's Barracks, for example, which occurred 1885, in fact falling on him.

In 1879 Cardew married his first cousin, May, daughter of Mansfield Parkyns, the well-known Abyssinian traveller. A happy married life, whilst either party lives, is too sacred a thing to be discussed; though, if anything whatever is to be said concerning Cardew's private life, this side of it cannot be passed over in complete silence. His home surroundings must at any rate be noted as amongst those elements which, by completely satisfying his desires, led to that indifference to public fame to be noticed presently. After establishing himself in a quiet house near the Medway, yachting still continued to be an important part of his life. Indeed all his summer holidays were henceforth spent afloat with his wife, the size of the boats he owned increasing with his family and his means, the last and largest, the *Lilith*, a cutter of 44 tons, forming for 10 years a summer home for themselves, their two daughters, and any available son. The account of Cardew's connection with the sea may be fitly brought to a close by the following narrative, given on the authority of an eye-witness, of an episode which needs no comment.

Cardew was in charge of submarine mining operations off Sheerness in 1877, and was directing the work from the deck of a small steam vessel known as a "Miner." There was a very strong tide running at the time, the steamer being in the middle of the channel, a long way from shore. A sapper, named White, fell overboard, and, being swept away by the current, which was running like a mill race, before a rope or lifebuoy could be thrown to him, and being unable to swim, it looked as if he must be drowned. Cardew took in the situation at once, and dived straight into the water without removing even his cap. He reached Sapper White when unconscious and once again disappearing, and, treading water, he managed to keep the man's head above the surface. It now seemed as if both would be drowned, so far away from the steamer had they been swept by the current. But the Miner fortunately having a dinghy in tow, Sapper Penrose with great promptitude jumped into it, let go the painter, and with a single scull over the stern reached them in time and brought them back in safety to the Miner. It was some while before Sapper White recovered consciousness, whilst Cardew, after changing his clothes, went about his work as usual. No one knew better than he did the fearful risk he ran in diving into that racing current with all his clothes on and with no help near. Yet he risked his life without

Digitized by Google

a moment's hesitation to save another's, and his modesty when the deed was done was in keeping with his character. Seldom has a nobler action been performed.

Although Cardew did not actually retire from the Army as a Major until 1894, his connection with the Royal Engineers ceased in 1888, when he was appointed the first electrical adviser to the Board of Trade. He took up the new appointment at the moment when legislative changes for the first time gave to electrical lighting companies a reasonable prospect of financial success, and when, therefore, the first rapid development was about to commence. The boom following the first legislation of 1882 had quite died out, but the recollection of it made the authorities cautious, and one of Cardew's first duties was to sit with Major Marindin on a long enquiry into the various proposals for the electric lighting of London, and, at its conclusion, to draw up a set of regulations concerning the supply of electricity for power and light. In framing these rules he had little to guide him, either as to the nature of the dangers to be anticipated, or in the existence of any similar regulations affecting other industries, and yet in many cases his actual wording is still retained, a proof at all events of his singular facility in drafting. Moreover, subsequent events have convinced those best able to judge that he exhibited very remarkable judgment with regard to the nature of the restrictions to be imposed. For example, he had to create purely arbitrary categories of "high pressure" and "extra high pressure"; and, not only have the limits he laid down been subject to no great changes since that date, but, as regards the higher limit of 3,000 volts, he hit off in a wonderful manner the point at which subsequent experience has proved that special precautions are necessary. The most surprising example of his foresight was, however, in devising the regulations to be applied to electrical tramways in order to prevent electrolysis; for the limit he suggested of 7 volts fall of potential in the rails, now appears to have been almost like an inspiration, because it has never proved to be a burden on the engineer whilst it has afforded effectual protection to gas and water pipes. He also devoted much of his time, when at the Board of Trade, to the establishment of the electrical standards laboratory.

Cardew retired from the service of the Government in 1898 in order to enter into partnership with his friend, Sir William Preece, and his sons, thus forming the well-known firm of consulting engineers bearing their names. He remained connected with that firm during the 12 last years of his life; and, as they were frequently consulted by the Colonial Office, the War Office, the Crown Agents for the Colonies, and the Admiralty, the work in hand was always of a very important character. In recent years he was

Digitized by Google

especially actively engaged in connection with certain Admiralty orders, involving an expenditure of over £1,500,000, every Government dockyard in the British Empire having received his personal attention either as regards electric power or light, whilst Gibraltar, Malta, and Hong Kong were visited by him in this connection. He also represented the Crown Colonies upon the International Conference respecting electrical units held in London in 1908, as well as serving on numerous committees considering questions of importance concerning electrical industries. Finally, he was retained by the Postmaster-General to assist the Post Office in the purchase of the National Telephone Company's system in 1911, a duty he was destined never to perform.

The work of this firm of consulting engineers was, however, by no means confined to business for the Government departments, and Cardew himself was particularly interested in electrical railways, tramways, and power schemes. Indeed, he was one of the few English engineers to recognize the advantages of the 3-phase and the single-phase systems of railway workings upon main lines. He was associated with the preliminary work upon the District Railway before the financing of its electrification was taken up by the Americans, and he was employed as an expert before several Parliamentary Committees on private bills. He, moreover, joined the Board of the London, Brighton and South Coast Railway in 1902, where his assistance was highly valued, and doubtless he had great influence as regards the electrification of the Victoria and London Bridge portion of this company's line upon the single-phase system.

Cardew's writings though not numerous were always of value. As early as 1881 he wrote a paper on the application of dynamo electric machines to railway rolling stock; in 1894 he contributed a paper to the Royal Society on unidirectional currents to earth from alternate current systems; and in 1901 he delivered the Cantor lecture before the Society of Arts on electric railways. He also contributed several papers to the Institute of Electrical Engineers, on the Council of which he served for many years, being elected a vice-president in 1901–2.

Having already on one occasion gone to Sydney in connection with the electrical installation undertaken by the Corporation of that city, Cardew set out again for Australia on the same errand early in 1909. Though unknown to himself, he was in truth in ill-health when he left England on this latter occasion. He was however able, though not without difficulty, not only to complete his work in the colony, but also to visit his son in Japan on his way home *viâ* that country and Siberia. Soon after his return to England he had to undergo a very serious operation, from which he never really recovered, and

Digitized by Google

after further operations he died in May, 1910, after having borne his long illness with extraordinary fortitude.

In the foregoing chronological sketch of Cardew's career, one element has escaped notice, an element which in truth was never absent, and that was his deep love of music. He must have begun to learn to play the 'cello fairly early in life, for many of his contemporaries at the S.M.E. will remember not only the strains issuing from his barrack room, but also the workings of his mobile face when trying a new and difficult passage. He undoubtedly became a good performer, and being a member of a family of exceptional gifts in this direction, he had many opportunies of enjoying concerted music. Some of our bandsmen may, moreover, still remember the interest he took in the R.E. Band all the time he was stationed at Chatham. Space forbids more being said on this subject, though these few words give but an utterly inadequate idea of the important part that music played in his busy life.

The reader who has read this memoir without having known the man it attempts to portray must be asking why it was that his name was not better known to the world at large, and why he never received any public recognition from the Government he served so well. His own answer, at all events, to this question would have been that the confidence placed in him by all the officials with and under whom he had served had been an ample reward for all his services; for, whether this was so or not—and we may well doubt it—he himself in truth cared but little for mere fame or notoriety. A man with only one aim in life must almost of necessity be ambitious, whilst one who is lucky enough directly his work is done to be able to find complete satisfaction in yachting, in music, or in home life generally, will have comparatively little difficulty in brushing aside any passing thought as to the possibility of his merits not being adequately recognized. No doubt Cardew was not a ready speaker, and this may perhaps have somewhat lessened the temptation to take part in public life of any kind. But it is in truth in that somewhat rare unselfishness which he showed with regard to his fellow workers, combined with his very kindly nature, that the key to his shrinking from publicity must be sought. Gentle and considerate were the terms most often applied to him in the many letters of condolence written after his death, epithets which are seldom heard in connection with those, who in reality hold in reserve large stores of determination and self-confidence ready for use in times of need.

A man does good less "by the mark which he may make on public affairs than by simply being himself. The impression made upon his contemporaries by a man of strong and noble character is something which cannot be precisely estimated but which we

Digitized by Google

often feel to be invaluable." These words, written by a man of great ability of a man of great power, apply with equal truth to Philip Cardew.

II. Technical Work in the Corps.

In attempting to form a proper estimate of Cardew's technical work in the Corps it is essential to bear in mind what was the state of electrical knowledge and practice in the world at large at the time when his work began. So rapid has been the advance in this subject during the last 30 years that it requires an effort, even on the part of one who had personal experience of those early days, to form a correct picture of the state of affairs.

In 1879 the Commandant, S.M.E., undertook to experiment for the R.E. Committee with various electric light apparatus, the bulk of the electrical work falling on the late Colonel R. Y. Armstrong, the Instructor in Telegraphy, and on Lieut. (as he then was) Cardew, his assistant. The dynamos for trial were four patterns of Gramme and two patterns of Siemens dynamo, all of which gave continuous currents and were series-wound; and three patterns of Wilde dynamo, all of which gave alternating currents, one being of the type that was then in naval use for searchlighting. This may be said to have comprised samples of nearly, if not quite, all the dynamos suitable for searchlighting then in existence.

At this time there were no incandescent electric lamps: no secondary batteries: no transformers: no rules as to the current-carrying capabilities of conductors of various sizes. The idea of the magnetic circuit had not been broached. So-called ohms, which were really B.A. units and rather smaller than the ohm, were available; but there were no voltmeters; no ammeters. Indeed at that time the ampere was called the "weber"; and the reputed volt was affected by the same error which caused the B.A. unit of resistance to differ from the true ohm. Clark's cell existed as a standard of E.M.F., but did not then perhaps command the confidence which it has since proved itself worthy of. The only measuring instruments of precision that were available for making the electrical measurements were the late Lord Kelvin's reflecting galvanometer and reflecting electrometer. Needless to say neither of these instruments had been designed for such work, the former reading in microamperes up to about half a milliampere, and the latter up to about a couple of volts. A transmission dynamometer had to be improvised with two pulleys and a steelyard.

The accuracy of the results obtained is believed to have been of a high order. But the process of obtaining them was tedious in the

Digitized by Google

extreme. They were embodied in a voluminous report rendered at the end of 1879.

Soon, however, it became apparent that the improvements which were continually being made in the design and construction of dynamos would entail experiments, involving electrical measurements, that would extend over several years. The need for more convenient instruments for measuring the large currents and differences of potential involved in such work was very severely felt. It was not long before Cardew designed a galvanometer for this purpose. This he described in a paper read before the institution now called the Institution of Electrical Engineers on 25th May, 1882. This galvanometer was used for several years at the S.M.E. and proved a great improvement on former methods. It never came, however, into general use. In course of time it was superseded by superior instruments designed by the late Lord Kelvin.

Almost simultaneously with the production of this galvanometer Cardew evolved the idea of the hot-wire voltmeter, an instrument which proved of the utmost value in the Service and also in civil life. It is this instrument which made his name familiar to all electricians throughout the world. It is too well known to require description here. What is perhaps not so well known is the amount of careful experimental work that was devoted to it to establish the proper conditions to ensure accuracy in its working. Major-General Porter in his *History of the Corps of Royal Engineers* mentions that Cardew was awarded the gold medal at the Inventions Exhibition for this instrument.

One original idea of Cardew's in connection with dynamos may also be mentioned here. It relates to a method of finding the efficiency of a dynamo. Two dynamos are mechanically connected. Power is supplied electrically to one of them from any convenient adequate source and this power is carefully measured. This dynamo, acting as a motor, drives the other dynamo which in its turn gives out power electrically, and this power is also carefully measured. Then the combined efficiency of the system consisting of one machine acting as a motor and the other as a generator can easily and accurately be determined. Moreover if the efficiency as a motor of the dynamo so used is known, or if the dynamos are alike in all respects and it is assumed that their efficiency as motors is the same as their efficiency as generators, the coefficient of efficiency of the dynamo acting as a generator is easily ascertained. If desired the same instruments can be used for the measurement of both "in-put" and "out-put." This method has a family likeness to the well-known Hopkinson method and to several others largely used in civil life.

Before quitting the subject of Cardew's work in the Corps in connection with electric lighting, mention must be made of the large

Digitized by Google

amount of work he did in connection with electric light projectors. Much of this related to the question of so mounting projectors as to expose them as little as possible to an enemy's fire; part to the question of the kind of reflector to be adopted, more particularly in view of the very heavy cost of the better class of reflectors then on the market. Mention must also be made of his work in the early days for determining the current-carrying capabilities of conductors of various gauges.

Turning now to Cardew's work in the Corps in connection with telegraphy, the following extract from Major-General Porter's *History of the Corps* gives a good account of his vibrator system of telegraphy.

"Its utility for military purposes has been demonstrated in more than one of our recent campaigns. During the Nile Expedition, at the most critical period, just after the fall of Khartoum, a serious fault occurred near Dongola. Communication was, in spite of this, maintained by the vibrator system for nearly 48 hours, until the fault was removed, although no signals could be obtained from any other instrument. It was also successfully worked for a considerable time on several lines consisting of bare wire laid on the ground without insulation, owing to the want of poles, etc. In other cases of faulty lines it also proved most valuable. The message announcing the victory of Tel-el-Kebir was sent from the field of action by a vibrator. It also did good service in working through broken-down lines on the Postal Telegraph system after the great snow-storm in the winter of 1886. The vibrator derives its extreme sensitiveness from the use of the telephone as a receiving instrument, and in order that the signals should be best adapted for this receiver, the currents are not steady in each signal, as in the ordinary systems, but are broken up into a succession of impulses of current which, when received on the telephone, cause it to give out a musical note of corresponding pitch. This is effected by the use of an instrument called a Vibrating Transmitter at the sending end, somewhat similar in principle to the ordinary electric bell. This forms a divided circuit with the line, and the impulses to line are thereby considerably strengthened over what they would be if the battery current were simply made and broken by an instrument not in the circuit, as is the case in the Elisha Gray vibrating system. The invention consists in the combination of the instruments for the purpose, and in the form of transmitter used."

The Indian Government wrote spontaneously to speak of the great value to them of this vibrator in war—in fact it had saved thousands of lives—and to suggest that Major Cardew should be rewarded and offered a money reward themselves. Eventually he received such a reward, half from the Imperial and half from the Indian Government.

The utility of this system of telegraphy is much extended by his

Digitized by Google

further invention of "separators" consisting of a combination of "choking coil" and two condensers. These instruments enable a vibrating telegraph circuit to be superimposed on an ordinary Morse circuit without interference between the two, thus doubling the message-carrying capability of the line. Some very satisfactory results of this description were obtained some 10 years ago in Ceylon.

Cardew's "apparatus for testing lightning conductors," which was introduced into the Service, must not be forgotten among his other inventions.

Digitized by Google

TRANSCRIPTS.

THE ASKHABAD COURSE OF INSTRUCTION FOR OFFICERS OF RAILWAY TROOPS.

Translation of an article appearing in the *Razvyedchik* of 24th May, 1910.

In 1905, a course of instruction for the officers of the Turkestan Railway Brigade was established at Askhabad, by the then Commandant of the brigade. The object of the course was to give officers of railway troops technical instruction in their special work. The experience of the recent war with Japan has shown that, in addition to general military knowledge, the officers of railway troops must acquire a really practical acquaintance with the construction and working of field railways, and of tramways (with both mechanical and horse traction) in time of peace, in order to ensure their thorough competence in time of war. None of the military colleges had furnished training of this nature.

The course held at Askhabad, lasts for one year. The subjects dealt with include:—theoretical and practical mechanics; the elements of hydraulics; water supply; steam engines and their construction; elementary surveying; building construction; railway construction; bridges, roadmaking in the field; excavation and tunnelling; demolitions; telegraphy; traffic management in its commercial, military and technical aspects.

The practical work includes:—preliminary surveys for railways of both narrow and broad gauge; the design of bridges; excavation work; engine driving over a distance of not less than 660 miles; the construction and repair of telegraph and telephone lines; and actual duty in railway stations in superintending traffic.

The course is under the supervision of the Officer Commanding the Turkestan Railway Brigade. The instructors are engineers on the Central Asian Railway, and officers of railway troops who are thoroughly qualified in the subjects dealt with.

The class consists of 12 officers selected from the 2nd, 3rd and 4th Russian, the 1st Caucasian, and the 1st and 2nd Trans-Caspian, Railway Battalions. Each of these units sends two officers annually. Lectures are delivered twice a week, and two half-yearly examinations are held.

Digitized by Google

Apart from the question as to how far this particular course satisfies the requirements of the case, it is obvious that as long as special railway troops exist, some special course of technical instruction for the officers is essential. Railway work in the field makes very extensive and varied demands upon the knowledge and capability of the officer. One day he may have to make a survey and plan a line; the next, he may be called upon to travel on the footplate of a locomotive; or to repair telegraphs, to organize traffic, or to carry out engineering work. The necessary theoretical and practical knowledge for such varied duties can only be acquired by a special course of instruction in railway work.

Digitized by Google

THE RECONNAISSANCE OF A FORTIFIED POSITION.

Translation of an article by Colonel V. Polyanski in the February, 1909, number of the *Eenzhenernee Zhoornal.*

Reconnaissance or scouting in the attack is properly speaking a duty which belongs to the cavalry, but such are the conditions of modern war that it has become impossible for the cavalry to deal with all the questions which have to be answered before the plan of attack can be decided upon. The modern arrangements for the fortification of a position are so complicated, and reconnaissance is rendered so difficult by means of masking and the use of dummy works, that none but Engineer specialists can understand from long distances the intention and character of the various fieldworks with which the enemy may have added to the strength of his position.

That special Engineer reconnaissance is necessary first became evident during Russo-Japanese War. In the month of September, 1904, when attack operations were in contemplation it was decided to form Engineer reconnaissance detachments, and these were recruited from among the officers of the Engineer and Sapper units.

In the following article a scheme for the organization and execution of this form of reconnaissance is presented, which is mainly based on the experience gained in this war. It must be allowed that many people refuse to allow their inclinations and confidence to be guided by the experience of the war, saying that in their opinion it was an exceptional war and not in keeping with any regular rules. To the Engineer however, who has had the good fortune to verify his theoretical training on those battlefields, the experience appears to be the very Alpha and Omega of up-to-date instruction in military engineering, and whether the war was an exceptional one or not, it is certain that the experiences of future wars and future battles (which will also be exceptional, and hardly ever under the exact conditions of theory) will more greatly resemble the war of 1904–5, than that of 1877–78, not to mention the wars of the beginning and middle of the last century.

These proposals for organizing this form of reconnaissance are therefore moulded on what was actually done by the Russians during the war of 1904–5. The sketches attached (see *Plate*) were actually made in the field by the author, when reconnoitring the Japanese positions on the Shaho on 25th November, 1904, but the shape of the ground has been slightly altered. The information about the nature of the works on German field positions has been obtained chiefly from the official "Instructions in Entrenching," from the works of Major von Fritz, lectures to the Berlin Military Academy, and from articles in the journal *Mitteilungen über Gegenstände des Artillerie und Geniewesens,* 1907.

Digitized by Google

THE ESTABLISHMENT OF RECONNOITRING DETACHMENTS AND THEIR WORK.

The preliminary reconnaissance of a position is generally allotted to a special party which should consist of officers of Engineers, Artillery and the General Staff. This party must not be large, as it must not attract the attention of the enemy by the large number of its horses. It moves with the mounted scouts and will act under the usual conditions of scouting service.

The task allotted to this party will be to explore the more distant approaches and the ground in front of the enemy's position, and if there is no map of the ground to make an eye sketch or a panoramic drawing of it. If the enemy is entrenched, it should discover the front and flanks of his position, the nature of his works, the sites of his strong points and obstacles, and the actual or probable positions of his batteries.

This done, the reconnaissance party can decide what local objects might serve as strong points in the defences of the locality which can be occupied by the attacking force, what are the most convenient approaches, and where there are suitable positions for the attacking batteries.

But as it is certain that the front of the enemy's position will be covered by cavalry and infantry outposts, the mounted reconnaissance party as above constituted will hardly succeed in obtaining sufficient details to serve as materials for drawing up the complete plan of attack, and consequently it is necessary to call upon the services of specialist Engineer and Sapper officers, and to form them into Engineer-reconnaissance parties, with the following duties.

1. To decide whether there are front positions, or front-lying strong points (Vorpostenstellung).

2. To decide the direction of the front of the main entrenched position (Hauptslellung), and its flanks.

3. To define its more important sections, and its strong and weak localities.

4. To locate the strong points, trenches, batteries (machine gun, mortar and howitzer), artificial obstacles and observation stations.

5. To endeavour to make out what are dummy works (Scheinanlagen), and the true positions of removable prominent objects, (Geländemarken), and

6. To decide the directions in which it would be advisable, under the peculiar local conditions, to carry out the attack, and to find out the most suitable approaches and observing stations.

When carrying out a reconnaissance of this kind it is necessary to bear in mind the fundamental rules for the fortification of a field position, as they are accepted by the Germans, and by their pupils the Japanese.

They agree in *occupying one line only and in strengthening it by all available means.* The preparation and occupation of a front position is recommended only in exceptional cases. These front positions (Vorgeschobene Stellungen) must be sited at such a distance from the main position, that the troops occupying the latter are not necessarily drawn into a battle started in the front position, in spite of the intentions of their commander, *i.e.* they must at any rate be at the distance of artillery range.

Digitized by Google

The front strong points which are sited *near* to the main line should be strongly fortified and weakly garrisoned, and should be supported by the fire of the main position.

The defences of the various sections of the position will generally take the form not of continuous lines, but of *groups* which are able to deliver *flanking* as well as frontal fire.

Fortified groups (Befestigungsgruppen) consist of systems of rifle trenches with their flanks inclined and echeloned backwards, and are intended for garrisons of not less than one battalion each. Fieldworks, such as redoubts, are only included in these groups in exceptional cases. In rear of the rifle trenches there are shelters for the reserves, and these are connected with the former by communication trenches. The crests of hills, villages or woods serve as local strong points. These strong points should be entirely surrounded by artificial obstacles, except only for masked approaches in their rear.

In rear of the more dangerous sections, if local conditions are favourable, special strong points (Stützpunte) may be constructed, to act as reserves.

Masking will receive especial attention. Dummy works are recommended, and prominent objects (Gelandemarken) will be made removable.

Field artillery will be placed in open or concealed positions according to its tactical objects and to the ground. *Heavy* artillery (mortar and howitzer batteries) will always occupy concealed positions, as near as possible to the roads. Great importance is attached to *safe observing*.

The very lowest parapets are recommended—·3 to ·5 metres,—and only where the object is to safeguard some point against a sudden attack, unsupported by artillery, are closed strong points with *higher parapets*, surrounded by obstacles, allowable.

The general character of the fortification of a position will consist of sections prepared for a purely passive defence; the active attacks being directed from their flanks.

Officers carrying out the reconnaissance must bear in mind these details, in order that they may correctly understand what they see before them.

Special Points about the Reconnaissance of Strong Points and Local Objects.

When observing a strong point in a hostile position it is necessary to decide:—

i. Its character, whether a system of trenches, a fieldwork or a local object, such as a village or wood;

ii. Its position with reference to the neighbouring sections and to the observer; its size, shape and the number of its garrison (infantry, artillery and machine guns);

iii. Its profile, the revetments of its slopes, blindages, the bearing of its principal firing line, whether there are obstacles, natural or artificial, and whether these have frontal or flank defence;

iv. If there are any convenient approaches leading towards it, and dead ground in its vicinity.

Digitized by Google

When observing a village it is necessary to decide :—

i. Its name (by interrogating the inhabitants, to verify the map), size, nature and materials of the houses (whether of stone, brick, or mud), number and width of its streets, the open spaces and the environs;

ii. The nature of the surrounding ground, whether dry or boggy, the approaches, and the nature of the defences.

When observing a wood it is necessary to decide :—

i. Its form, length, breadth, nature and size of trees, thickness, the direction, length, form and nature of the edges; whether there are open spaces, their width and direction, glades, ravines, rivers, streams.

ii. Whether it is prepared for defence, the nature of the works, abattis, second line of defence, salient angles; also the approaches to it.

When observing a defile it is necessary to decide :—

i. Its nature, whether open (bridge) or concealed (mountain pass), its length and breadth, nature and dimensions of exits, and if there are any side roads by which it can be turned;

ii. The character of its defences, *i.e.* whether it is obstructed (passive defence), or rendered secure (active defence); and the approaches to it.

When observing a river :—

i. Its name, direction of current, width, depth, rate of current, nature of banks and bottom, passability at fords, nature of bridges and their number, whether there are dams, locks or other means of crossing. Which of the banks is the higher and what is the height of the banks above the surface of the water. Where and what roads cross the river, and whether any roads run along its banks.

ii. Whether the crossings are fortified (obstructed, or rendered secure); the nature of the works and the approaches to them.

When observing a marsh :—

Its extent, length and breadth; nature, *i.e.* depth, dry localities, rivers, streams, overgrown places; the paths which cross it, their direction and quality; whether it can be crossed without paths, where a crossing can be constructed; where the enemy has fortified it, the nature of his works and the approaches to them.

When observing a ravine :—

Its direction, length, breadth, whether its banks are accessible, their nature and the command afforded by them; where it can be crossed without roads, whether it is possible to go round it, and what local means exist for crossing it.

When observing a bridge :—

i. Its situation with regard to its surroundings, its length, breadth, height above water level; construction, number and length of bays, siting and dimensions of piers, girders, struts, ties, superstructure;

ii. Character of bridgehead defences, nature of surrounding ground, approaches to bridge, proposals for its demolition.

METHODS BY WHICH ENGINEER OFFICERS CAN CARRY OUT RECONNAISSANCES.

The reconnaissance may be carried out on horseback, in an armoured automobile, from a balloon or dirigible, or on foot.

Digitized by Google

i. Mounted reconnaissance is carried out when time is pressing and other means are impossible, and can give only general information. It consists in making eye surveys or hand sketches of the ground, on which everything noted by the observer is reported.

ii. Reconnaissance in an armoured automobile can only succeed and be of any material use when the enemy's position is badly guarded, when good roads exist along his front, when the ground is well known, or when his outposts are driven in by a reconnaissance in force. This is in reality not a reconnaissance, but a rapid observation of the enemy's dispositions, carried out with the object of elucidating and obtaining greater details concerning some doubtful point in a reconnaissance already made. Success is only to be obtained by bold, determined and rapid action.

iii. Reconnaissance from a balloon or dirigible will probably give the fullest and most accurate results. It requires practice and such reconnaissance can only be carried out by balloon specialists.

iv. Reconnaissance on foot is the only kind which can give good results when balloons and dirigibles are not available. For this reason it is now proposed to deal with this method in greater detail, and to give a few practical hints which may *partially* make up for want of practice in peace time.

Reconnaissance by Engineer Officers working on Foot.

The Engineer reconnaissance detachment is divided into parties each consisting of two officers and a mounted orderly. Each officer must be provided with a plane table (sketching case) with compass and paper marked in squares, a field notebook, coloured pencils, pair of compasses, the latest map of the ground, if one exists, in a cellulose wallet, to enable it to be used in the rain, and field glasses.

The reconnaissance is organized as follows:—The commandant of the Engineer reconnaissance detachment allots the ground to the various parties, giving to each 600 to 900 yards of front. He communicates to each officer the information about his own section which has already been gained by the mounted scouting parties, and points out to each the objects of his reconnaissance and the special information which he is required to obtain.

Having received their work, each party, moving cautiously and secretly behind folds of the ground and any other natural cover, endeavour to ride as near as possible to the enemy's position. As a precaution the hoofs of the horses should be muffled with rags, and care should be taken that all accoutrements are well fastened and do not rattle. If the ground is well known the start should be made before dawn, so that the party may move under cover of darkness and reach their observing point ready to begin work at daybreak.

In order not to miss the way they should always be able to take their bearing by the ground and to interpolate their position. The following are some useful methods of taking bearings:—

i. By means of map or plan. This is done by making a study of the ground before starting on the reconnaissance, and learning the relative positions of the various local objects.

Digitized by Google

ii. By compass, for which it is necessary to know the bearing of the line in which one has to move.

iii. By watch and sun, by turning the hour hand towards the sun and mentally bisecting the angle between it and the figure XII. This gives approximate south.

iv. By the sun, which is to be found:—

	March.	June.	September.	December.
East at	6.0 a.m.	4.0 a.m.	6.0 a.m.	8.0 a.m.
South-east at ...	9.0 a.m.	8.0 a.m.	9.0 a.m.	10.0 a.m.
South at noon all the year round.				
South-west at ...	3.0 p.m.	4.0 p.m.	3.0 p.m.	2.0 p.m.
West at ...	6.0 p.m.	8.0 p.m.	6.0 p.m.	4.0 p.m.

v. By the moon, which is to be found:—

	In First Quarter.	At Full.	In Last Quarter.
East at	—	6.0 p.m.	12.0 m.n.
South at	6.0 p.m.	12.0 m.n.	6.0 a.m.
West at	12.0 m.n.	6.0 a.m.	—

vi. By the Pointers of the Great Bear, which show the direction of the Pole Star.

vii. By local objects:—the moss growing on trees shows the north, the altars of all Christian churches are towards the east, those in mosques towards the south, etc.

When it is impossible or inadvisable to go any further on horseback, for it is easy to fall into an ambush, the officers dismount, and leaving their horses under cover with the orderly, endeavour to work further forward on foot and to choose a suitable place for observation. The success of their reconnaissance will depend on the result of this search. The point should first of all be chosen roughly on the map, but the final choice must be made upon the ground itself. In choosing it should be remembered that a place which may appear to be exceptionally good may be so conspicuous that it will draw on itself the attention of the enemy, and that a better concealed place may be more suitable for safe prolonged observation, so long as its field of view is large enough to allow the carrying out of the special task in hand.

As soon as they are conveniently and secretly posted, the observers begin their work. One of the officers prepares a rough survey sketch of the ground, and the other a panoramic sketch. This done, each shows on his sketch the point from which he is observing, and then begins to fill in the details of the hostile position as they gradually become evident to him.

The *survey sketch* must show graphically everything that concerns the object of the reconnaissance, and nothing more. The roads, rivers, villages, heights and other local objects are drawn in from the map, and the sketch is then completed by observation, care being taken that everything is shown absolutely to scale. Whatever cannot be shown graphically is written in on the side, heights and distances are given in figures.

The scale of the survey sketch, for a length of front of about 800 yards, should be 100 yards or 200 yards to the inch; plans of special localities

Digitized by Google

and strong points should be made to a larger scale, 50 yards, or less, to the inch.

The flanks of neighbouring sections of reconnaissance should overlap to facilitate the connecting up of all the sections into a general plan. It is extremely important to take bearings to various points along the hostile position, in order that the positions of these points may be found by intersections on the general plan.

Panoramic sketches, or sketches of the shape of the ground on a vertical plane, are useful in addition to survey sketches as giving a clearer representation of the hostile position. They must show accurately the form of the country and all sharply defined objects, such as trees, houses, roads, churches, etc., and, with especial care, the hostile position in the aspect in which it presents itself to the observer.

The paper on which the panorama sketch is drawn should be prepared with 10 to 15 vertical lines at equal distances of 1 or $\frac{1}{2}$" apart, and with 3 to 5 horizontal lines drawn on the lower part of the paper at equal distances apart of one-half those of the vertical lines.

For estimating the relative positions of local objects a "perspective scale" is necessary. A simple method, which is in common use in the Artillery, is to extend the right hand to full extent and turn the three centre fingers vertically upwards. For all men the breadth of these three fingers, held close together, is approximately ten times their distance from the eye, so that the width of ground concealed by these fingers is one-tenth of its distance from the observer. In the same way the width of ground concealed by the whole hand is ·2 of the distance, and the width covered by the extended fingers and thumb is ·3 of the distance. Any one of these measurements can be taken as the width represented by the intervals between the vertical lines on the paper, but whichever is chosen should be distinctly noted at the foot of the sketch.

The writer suggests another method by which the object is not concealed during the operation, as it is with the raised fingers or hand. This is done by extending the arm and raising the thumb only, and then observing the object with first one eye and then the other. In this case also the interval between the eyes is approximately ·1 of the distance between the eyes and the thumb.

In making a representation of the ground upon the paper thus prepared, the top horizontal line will show the extreme sky-line and the bottom one the immediate foreground. Some sharply defined local object is put approximately in the centre of the picture, and serves as a referring object when filling in the various details. The name of this object should be noted in the left corner of the sketch, and also its compass bearing from the observer. In filling in other details their distances from the referring object are found by means of the fingers. In this way a series of objects gradually appear on the sketch. The contour of the hills is finally filled in, and in doing this their characteristic peculiarities should be shown generally, and not small folds in great detail.

All survey sketches and panoramas should be completed with scale, north-point, time and the signature of the observer.

Everything noted by the observer should be shown on survey and

Digitized by Google

panorama, but if anything excites his doubt or uncertainty he should note the fact by means of a mark of interrogation.

The information required of an Engineer reconnaissance of the enemy's dispositions on a position can only be obtained by patient, attentive and prolonged scrutiny. Not only before a battle, but even during a modern battle, is the utter *emptiness* of the field of battle noticeable, and for this reason observing is extremely difficult, and success will depend mainly on the choice of the observing point, the eyesight of the observer, his field glasses, and above all on the *practice* he has had at his work.

Reconnaissance is more easy in hilly country than in the level, partly because better observing stations are obtainable and partly because of the greater difficulty in concealing works of fortification. Trenches for instance encircling a hillside show up as dark lines, however well they may be coloured to match their surroundings. This is due to the effects of light and shade upon the sloping ground. Obstacles also are easily seen, as it is difficult to conceal them on high ground. A battery firing from a concealed position may be located by the dust, which rises in a light cloud from behind the mask; this also may disclose the site of the enemy's camping ground.

If there is any movement on the hostile position, if works are being thrown up or men are noticeable, then the reconnaissance is greatly facilitated, and it is only necessary to follow attentively the movements of the men. Masks and dummy works can be discovered by noticing the dispositions of the men with relation to them.

If men appear to remain a long time without stirring, they are probably dummies. In the late war the Japanese often made dummy batteries of carts and logs, with detachments of dummy men, while the actual batteries were placed somewhere near by, but outside the spheres of danger of the dummy batteries. To complete the illusion they used to fire pyroxilene cartridges in the dummy batteries, so that the flashes and dust should give the effect of firing. All such dummy works may be discovered by careful and prolonged scrutiny.

In level ground observing is very much more difficult. The observing points will have to be in trees, (but not isolated ones as in these he will be seen at once) the roofs of houses, observatories, church towers, etc. A well-masked trench, especially if without a parapet is very hard to see; felled bushes, trampled-down grass or corn may reveal it; if the trench is loopholed it is very quickly seen. A wood, put in a state of defence, may be recognized by felled trees and abattis, which are very difficult to hide. Villages, like those in Manchuria, which are surrounded with walls of mud or brick, are usually adapted for defence by piercing loopholes in the walls of the houses. These loopholes can be seen from a great distance, and by counting their number it is possible to estimate the amount of fire which can be developed from the village in any particular direction. Villages like those in Russia, which are not surrounded by walls, are prepared for defence by digging trenches in their outskirts, or in front of them, and from this it can be decided whether they are held or not.

During reconnaissances in force Engineer officers must use every possible opportunity of getting close to the enemy's fortified position, in

Digitized by Google

order to amplify the information which they have already gained by reconnaissance.

The reconnaissance parties must send in detailed reports of their reconnaissances, with their survey and panorama sketches, to the commander of the Engineer reconnaissance detachment, who will prepare the general combined report, which he will present to the staff of the attacking force as material on which to prepare the plan of attack.

In conclusion the author mentions some of the reasons which urged him to write this article.

Reconnaissance by Engineer reconnaissance detachments was practiced to a large extent during the late war, especially in the second half of it, and produced very good results. Detailed and accurate sketches of the enemy's fortified positions were prepared in this way by Engineer officers, and General Kuropatkin often referred to them. Besides this it is quite evident that in these days of long-range projectiles, which can hit at a greater distance than a man can see, it will be possible on fewer and fewer occasions to get near enough to a hostile position to observe, accurately and in detail, what has been done upon it in the way of fortification. Only specialists well acquainted with the technical and tactical methods of the enemy can appreciate and *understand* what they see in front of them, especially when it is remembered how widely dummy works of every kind will be applied in the future. The cavalry and other scouts may report that such and such a village is occupied, there trenches are visible, elsewhere entanglements, etc.; but they cannot give a general, complete picture of the fortified position, with its mutually supporting chain of strong points.

There is no doubt that in the future reconnaissance by Engineer parties will be widely applied, but the success of the work, as has been said above, depends mainly on *practice*. The specially favourable circumstances of the late war gave the Russians opportunities for learning in the field, but experience showed that the early results were wretchedly bad, and the knowledge was gained at a price which was heavy and sometimes bloodstained.

But the circumstances of the late war may not occur again, and in a future campaign the troops may find themselves in action with no more experience than has been studied and mastered in peace time.

Meanwhile no practice at all is being gained in peace time in the Engineer reconnaissance of a position. Very few Sapper officers, who did not take part in the war, have ever seen what is the appearance of a rifle trench on a hill or on the level, at various distances.

It is suggested that this deficiency should be remedied by training the Sapper and Engineer officers in the following way: —

i. At the Engineer School. When the students are, during the summer, solving tactical-fortification problems in the field, they should be practiced concurrently in defining the distances of local objects by eye (from their apparent size) and by help of the fingers as described above; in deciding the heights and dimensions of hills, the steepness of their slopes, the approaches to them and the ground near and distant, which is defiladed from them; in fixing the enemy's probable artillery positions and observa-

Digitized by Google

tion stations; in noticing the appearance of front-lying ground when seen from a commanding height and from the level, and in obtaining bearings without a compass, etc.

Several of these exercises are extremely simple, but they should be gone through at least once, as otherwise in spite of their simplicity they might not occur to the student when required.

It would also be useful, for example, when visiting an artillery range or field firing ground to train the students to tell by the burst of a shell or shrapnel what is its calibre; at present they only learn what gun makes most noise, which has absolutely no military value. By the trajectories of the shrapnel bursts the distance of the battery which is firing can be gauged, and by the character of the fire some idea may be gained of the target at which it is firing. All of this is very interesting and necessary for reconnaissance observation and exercise. At the same time the student would obtain at least an approximate acquaintance with the circumstances of a modern battle.

ii. At the Engineer Academy. During the tours carried out for the study of fortress fortification, the reconnaissance of a small section of the fortress belt should be included in the programme with fixing bearings, defining distances, approaches, etc., and the preparation of survey and panorama sketches. Only one day would be devoted to this work, and its utility would be great.

iii. During Sapper camping periods it is recommended that Sapper officers should learn the appearance of the different fieldworks from various distances, and should also practice obtaining bearings, estimating distances by eye and by the help of the fingers, etc.

The late war was a searching examination in all the methods of peace training, and impartial opinions agree that the Russian engineering troops, in spite of a few deficiencies, as a body passed this examination splendidly. But the war unfortunately only produced examples of retirements and defence without counter-attack.

In future it is to be hoped that, following the maxim of the great Suvorov, the attack will be the rule. And in the conditions of the modern battle *Reconnaissance in the attack plays a pre-eminent part, and takes the place of the personal reconnaissance by the Commander-in-Chief of the probable field of battle.*

In order that they may again pass the examination of war, Engineer officers *must learn the reconnaissance of the battlefield in peace time.* In war it is too late to learn. "La campagne serait terminée que notre instruction commencerait, mais au prix de quels résultats? Malheureux sans doute."

F. E. G. SKEY.

Digitized by Google

NOTICES OF MAGAZINES.

Boletin Militar.

Two copies have been received of the *Boletin Militar*, a new military periodical the first number of which appeared last January, and which will be issued monthly by the Ministry of War and Marine of the United States of Venezuela.

Each number consists of about 40 pages, and part of the matter is supplied by the military and part by the naval branch of the Ministry. The number for May contains a description of the Steward Telemeter; tables showing the admissions to and discharges from the Military Hospital at Caracas during the first three months of this year; a note on the means of determining the error of eccentricity in sextants; a short description, chiefly hydrographical, of the Peninsula of Araya; some notes on the Schneider-Canet 15-c.m. Q.F. gun; a short description of the Island of Toas; instructions for the employment of the Barr and Stroud Range Finder; and a short note on the employment of oil fuel in the British Navy.

'M.'

Nature.

August, 1910.

Cordite.—The production of a smokeless powder was ever the dream of the military strategist, and with the discovery of guncotton the conclusion was hastily arrived at that the ideal propellant was found, only to be rudely dissipated by numerous serious disasters. Guncotton for a long time resisted all attempts to render its combustion sufficiently under control for it to be adapted as a propellant, yet to-day it is the basis of the smokeless powders of all nations. Its early failures were entirely due to the retention in the nitrated cotton of the physical characters of the parent cotton, for even after reduction to an extremely fine state of division during the process of manufacture, the fibrous nature of the cotton persisted. Success has only been obtained by the destruction of this fibre, and the smokeless powders of all nations may be classed either as simple gelatinized guncottons, in which soluble nitro-celluloses have been gelatinized by treatment with an ether-alcohol mixture, or as nitro-cellulose nitro-glycerine colloids, in which the nitro-cellulose employed may be of the soluble variety, as in ballistite or the insoluble (true guncotton), as in the case of cordite.

Digitized by Google

The introduction of blasting gelatin by Nobel (1875) consisting of some 90 per cent. nitro-glycerine with 10 per cent. of soluble nitrated cotton in a gelatinized form, was the first step towards the production of powders of the cordite type. The high percentage of nitro-glycerine rendered blasting gelatin unsuitable for use in guns, but by incorporating the two constituents in equal proportions, Nobel gave to the world the first successful smokeless powder of this class, ballistite.

Cordite was the work of the late Sir Frederick Abel and was patented a year later than ballistite, in 1887. The essential difference between ballistite and cordite is, that while the former contains soluble nitro-celluloses, cordite contains the insoluble or tri-nitro-cellulose. This change in the character of the nitro-cellulose employed, entailed the introduction of acetone in the manufacture of cordite. Soluble nitro-cotton and nitro-glycerine can be thoroughly incorporated in the presence of water without the aid of any solvent, but the ingredients of cordite can only become incorporated in the presence of a mutual solvent. It is essential that the solvent shall be sufficiently volatile to admit of its removal at a low temperature from the finished powder, and acetone, which boils at 50° C., fulfils all the conditions best.

Nitro-glycerine is the only explosive containing an excess of oxygen, all nitro-celluloses being deficient in this element to give complete combustion of carbon to carbon dioxide and hydrogen to water. It follows that the incorporation of these two explosives with each other is desirable. The total change in physical characters of both brought about when mixed entirely alters the character of their explosion ; singly, both constituents are beyond control, once combustion is started; gelatinized together, combustion is regularly progressive throughout the mass, an essential condition for a propellant.

Cordite at first consisted of 68 per cent. nitro-glycerine, 37 per cent. nitro-cellulose, and 5 per cent. of vaseline, but this caused serious erosion in the guns due to the rapid motion of the gaseous products at a very high temperature. This led to the introduction of modified cordite—called MD—30 per cent. nitro-glycerine, 65 per cent. nitro-cellulose, and 5 per cent. vaseline, a reversal of the former proportions of the ingredients. Vaseline reduces the metallic fouling in the gun and provides just the slight lubrication needed, it also acts as a "stabilizer" in the cordite.

In the manufacture of (MD) cordite, the guncotton is dried at a temperature of 40° C. and is then mixed by hand with the due proportion of nitro-glycerine, and passed through a sieve. This paste is then kneaded for about seven hours with acetone and vaseline in a machine originally designed for kneading baker's dough, the acetone causing this mass to assume the consistency of dough. The dough is then "squirted" by hydraulic pressure through slits of suitable diameter, cut into lengths and taken to the drying chamber when the evaporation of the acetone at a temperature of 105°, causes it to lose its plasticity and converts it into the semi-horny mass from which its name is derived. The size in use for rifle cartridges being only ·0375" in diameter, is, however wound on reels, and not cut into lengths until required in the cartridge-loading room.

Digitized by Google

One of the most important considerations with reference to any explosion is its stability under ordinary conditions of temperature. The explosive properties in such substances as nitro-cellulose and nitro-glycerine depend entirely on molecular rearrangement, which is practically instantaneous when detonation occurs.

Slow decomposition occurs in most nitro compounds of the explosive class at temperatures not greatly above the normal with the production of oxides of nitrogen, and it has been shown that these oxides act catalytically on the explosive; in other words their effect becomes cumulative and may lead to ignition. "Stabilizers" have been introduced capable of absorbing these nitrogen compounds and the vaseline in cordite appears to perform this useful function.

W. E. Warrand.

Revue Militaire des Armées Étrangères.

February, 1910.

Military News from Divers Countries.—*Austria.*—The mountain artillery is in process of being re-armed with a new 10-centimetre howitzer. The howitzer is a long-recoil weapon, and can be separated into three parts for transport purposes, each part weighing about 300 kilogrammes. It is protected by a shield made in two parts.

Belgium.—The new military law, passed on the 1st December, is to provide a fighting force of 42,800 men always under arms, the average time of service for each man being 23·3 months.

Germany.—The following new courses have been instituted at the Infantry and Musketry School:—(1). An "information course," for senior officers of the infantry and cavalry. (2). An "instructional course" for captains and lieutenants. (3). A machine-gun course, for the commanders of battalions to which machine guns are attached. (4). A "practice course," for young infantry officers, and cavalry N.C.O.'s.

The Imperial manœuvres will take place this year, between the 8th and 10th September, on the east of the Vistula, between that river and the Passarge.

Italy.—After several experiments on the organization of the machine-gun sections, the Italian Government has at last decided to adopt the system of two-gun sections equipped with maxims carried on pack saddles. Each Alpine battalion, infantry or cavalry regiment has a section attached to it. A manual on the employment of machine guns has been issued. The section is to be regarded above all as a reserve fire unit at the disposal of the battalion, etc., commander, which he is to use chiefly against very visible moving targets, or at critical moments in the fight.

An aeronautical course, for the training of airship pilots has been instituted, and can be attended by any artillery or engineer subalterns who desire to do so. The qualifications required to be allowed to attend this course are:—(1). To have sufficient scientific and technical knowledge

Digitized by Google

to be able to go through the course with advantage: (2) to be physically fit: *i.e.* not to suffer from any nervous, cardiac or pulmonary complaints, and to have good eyesight and good hearing. The course will be divided into two parts:—(*a*). The theoretical training, which takes place at Rome and lasts 45 days. In this part of the course, the candidates are taught all about the construction of balloons, and dirigibles, and special attention is given to the putting together and dismantling of propellers, motors, and propelling gear. (*b*). The practical course lasts 6 months, and takes place in the Vigna di Valle, north of Rome. The course may be finished by a cruise on a sailing ship, to enable the future air-pilots to familiarize themselves with the working of sails, and to improve their physical condition.

March, 1910.

MILITARY NEWS FROM DIVERS COUNTRIES.—(1). *Austria.*—The use of the ski, which before 1907, was practically unknown in the army has gradually increased in importance. In the winter 1909–10, 60 officers and 60 N.C.O.'s were put through a ski-course, and, as a result of experiments made in 1909, an official manual on the military use and employment of skis and snow rackets was issued. Experiments were made in the transport of machine guns on the backs of ski-ers, and on the connection of posts by means of men on skis. It was found possible to reduce the load on each man to about 20 kilogrammes, and by this means the machine guns could be carried to the tops of hills too steep to be practicable for ordinary pack animals. As regards the second experiment, it was found possible to transmit a message over a distance of 34 kilometres in 1 hour and 40 minutes by using five groups. Seven officers and 46 men were thus employed. The message was sent through on a day when there was a blizzard.

The first Austrian wireless telegraph station was opened to the public in February, 1910; it is at Pola, has a normal range of 500 kilometres. and is provided with all the latest improvements in the radio-telegraphic line. Two other stations will shortly be opened on the Adriatic coast line. Each infantry and rifle company is issued with 16 small and 4 medium wire nippers, and each squadron with 8 small and 2 medium ones. The small nippers are intended solely to cut wire, the medium to cut branches or creepers as well. The small size weigh 289 grammes, and with them two men should be able to cut through a network of wire 12 metres broad in 15 minutes.

(2). *Germany.*—In February, a 10 days' training was carried out by the Communication troops of the German Army, in the Harz Mountains with the object of finding out the facility with which motors, and motor bicycles can operate in hilly country in the winter, when the ground is covered with snow or frost. In many cases, as the depth of the snow exceeded 1 metre, it was found necessary to use men and even horses to extricate the vehicles.

On May the 11th the German automobile corps carried out, in conjunction with the Austrian automobile corps, a series of trials between Dresden and Vienna.

Digitized by Google

A corps of volunteer motor cyclists has just been raised. Its members must be of German nationality, have served their time in the regular army, and be in possession of a serviceable motor bicycle, with tools, etc. In the event of mobilization, they will receive an indemnity of £10, be supplied with clothing and equipment, and receive a salary of 10s. in Germany, or 12s. in foreign countries. Their bicycle is bought by the Government on the outbreak of war, and they are allowed 1s. per diem for running expenses.

(3). *Italy.*—Two annual courses of optical telegraphy, each lasting two months and starting on the 1st March and 1st May respectively, have just been instituted in the Italian Army. They are open to officers and N.C.O.'s of the coast and fortress artillery, and to those of the Alpine regiments.

(4). *Argentine Republic.*—The infantry has just been reorganized and is to consist of 10 brigades each of two regiments; two brigades are allotted to each military district. The first battalion of each regiment is to supply the regimental staff. Only the regiments with odd numbers (1, 3, 5, etc.) are however to have two battalions.

(5). *Russia.*—Definite age limits for the retirement of officers have at last been instituted. They are determined not by the rank of the officers, but by the appointments which they hold, and are such that an officer cannot be appointed to any billet, if age will force him to retire from it before he has held it for three years. In time of war the rules are to remain in abeyance; they are also waived aside in the case of officers who won the military order of St. George in the Manchurian campaign.

April, 1910.

(1). THE OPERATIONS ROUND MELILLA.—This and the previous number contain a long account of the operations round Melilla. The following notes are taken from the remarks at the conclusion of that article, on the conduct of the campaign.

(*a*). The Spanish Government showed remarkable tenacity of purpose in carrying through the campaign, in spite of the opposition it met, especially after the first reverses, which were a great blow to the national pride.

(*b*). The war had been well anticipated by the Government in the matter of *matériel*, but the *personnel* was not as well trained as it should have been, owing largely to the practice of granting long periods of leave to the troops, with the result that the existing units were nothing more or less than cadres. As such they had not the necessary training to fit them for service in the field. This disadvantage was however to a certain extent counter-balanced by the policy of the War Office in sending to the front, not isolated battalions, or companies, but whole brigades from one spot, *i.e.* troops trained to work together.

(*c*). There was considerable difficulty throughout the campaign in properly combining the action of the artillery and infantry. This was in a large measure due to the tactics of the Riffians, who having once experienced the effects of artillery fire, retired after the opening of the fight in very open order, thus taking its target away from the artillery, and forcing the infantry to advance, and bear alone the brunt of the fight.

Digitized by Google

(*d*). The proportion of cavalry in this campaign, (17 squadrons) was very large, considering the mountainous nature of the theatre of operation. The cavalry was hardly ever used as is laid down in most modern field service regulations, *i.e.* pushed well forward so as to undertake the duties of protection and reconnaissance. The squadrons were singly attached to portions of the column and protected them, thus their sphere of action was but small. When the occasion arose, the cavalry charged the enemy with a bravery and temerity worthy of the oldest traditions of the Spanish nation.

(*e*). As a rule at night the outposts were placed too near to the main body, and too much reliance was placed on mechanical alarms, such as networks of wire, searchlights. The result was that false alarms frequently kept large bodies of troops the whole night under arms.

(*f*). Machine guns were found to be of the greatest use during this campaign. They might however have been still more useful had they been pushed further forward into the firing line. The failure to do this is ascribed to lack of training.

(*g*). The proportion of artillery was a comparatively small one—only 2 guns per 1,000 men—but the services rendered by both field and mountain batteries were very great.

(*h*). The expeditionary force was accompanied by a large number of engineer troops, and thanks to the attaching of a company of telegraphists to every infantry brigade, communications were remarkably well kept up. The balloon company was also of great use to the force both for reconnaissance and in assisting in mapping out the Gurugu massif.

(*i*). The only branch of the army which did not prove itself entirely satisfactory was the medical corps. The doctors themselves performed their duties with enthusiasm and devotion, but there were not enough mules or carts to carry the wounded from the battlefield, and from the field dressing stations to the head hospital at Melilla.

(*j*). After the campaign the Spaniards immediately began to construct roads joining Melilla to the principal posts in the district, and to organize a corps of native troops under European officers, so as to minimize the number of European troops in the province.

(2). MILITARY NEWS OF DIVERS COUNTRIES.—*Germany*.—A new manual on the methods of feeding an army in the field has just been brought out. It consists of:—A preface indicating the general principles on which to carry out the feeding of an army in war time. Part 1:—which gives the rates to be paid and the scale of issue of rations. It also points out the various means of obtaining those rations, *i.e.* by billeting the troops on the inhabitants, by issuing rations to the troops, or thirdly by giving the troops money and letting them buy food for themselves. These methods can all be used concurrently, if necessity arises. They are normally to be employed as follows:—In Germany, method (*a*) for troops on the march or in cantonments, otherwise methods (*b*) or (*c*): in an ally's country his own methods will have to be employed: in an invaded country, method (*a*) will be employed as much as possible, otherwise method (*b*). Part 2 deals with the supply of forage. The

Digitized by Google

regulations are very similar to those affecting the supply of rations. Part 3:—Organization and accounts.

Italy.—Lieutenants of the infantry, cavalry, artillery or engineers, who aspire to promotion by selection, have to undergo two special examinations, viz. a preliminary and a final exam. The preliminary examination includes:—essays on a tactical subject, history, and geography, and a sketch. The final examination includes six tests:—An examination in a foreign language: a practical test of the candidate's skill in handling troops on the ground: a tactical exercise with skeleton formations: a riding examination: a written exercise on the employment of the three arms: an oral discussion on the subjects of the written tests. Staff officers need not undergo this examination. As a result of the examination the seniority lists will be altered.

A. H. Scott.

Rivista di Artiglieria e Genio.

May, 1910.

French and German Opinions on the Military Employment of Dirigibles and Aeroplanes.—This article contains extracts from a report published in the *Revue d'Artillerie* of last December. The application of dirigibles to military purposes may be referred to under the following headings:—

1st. At the commencement of mobilization a dirigible stationed at one of the frontier posts can be placed at the disposition of the Commander-in-Chief for reconnoitring the enemy's points of concentration, lines of communication, etc.

2nd. In a campaign in the field, a dirigible may be assigned to an army for reconnoitring purposes and will prove useful during the march and can be pushed forward in advance.

3rd. In siege warfare, the dirigible may be employed for reconnoitring the lines of investment under conditions much more favourable than those of a captive balloon, because it can be transported wherever its presence is necessary, and the inequalities of the ground will not cause any impediments to observation.

4th. The dirigible can establish communication between a besieged place and the interior of the country either by day or by night.

5th. The employment of dirigibles for offensive action by the discharge of explosives on certain points of the ground occupied by the enemy may also be considered. The trials made with the "Lebaudy" in this direction demonstrate the possibility of such employment, but it still seems premature to transform the dirigible into an actual fighting factor, its powers of destruction being limited.

6th. Finally, by the several uses referred to above the dirigible may produce a considerable moral effect. The army that is not assured of

Digitized by Google

the dominion of the air will remain always under the demoralizing effect of a continuous threat.

The dirigible can ascend to a height of about 1,500 m. and can maintain itself in the air for several hours with an average velocity of 50 k.m. Its radius of action should be about 200 k.m., according to its distance from the ground, and its velocity, its own vulnerability is lessened, without diminishing its power of observation. By the action of its motor it has the certainty of being able to alight outside the zone occupied by the enemy.

The military aeroplane is chiefly a machine for exploration, and in the future may be destined to carry an observer who should be free from the charge of conducting the machine, and who should be able to devote his attention entirely to taking notes and photographs of the enemy's position, etc. In case of stoppage of the motor the machine should be able to take the ground without danger to the *personnel* or to the material. These conditions of security are most necessary, since an aeroplane destined to work in connection with troops would only prove a permament danger to them if it was forced to descend in their midst. It would then be necessary that a military aeroplane should be provided with two motors, either of which would be capable of sustaining the machine in event of injury to the other. The machine should be capable of ascending to a height of at least 400 or 500 metres. The aeroplane may also serve as an organ of communication between an army corps and detachments charged with special missions, such as divisions of cavalry. It travels at a greater rate than an automobile, which has generally to follow an itinerary less direct and frequently on roads in an encumbered and wretched state, so that there would be less chance of its being captured by the enemy. It would also be able to establish communication between a besieged fortress and the external world. With boldness and a little good fortune it might easily find means of passing over the investing lines without being exposed to the enemy's fire.

With regard to the instruction of the pilots and the observers, considering that the use of aeroplanes in war cannot be effected without danger to the *personnel*, the preparation of such *personnel* in time of peace is a very delicate operation, and should be conducted with great prudence to avoid the danger of loss of life and material. The preliminary exercises should be executed in connection with the manœuvres, so that the machines now existing may be able to participate in the manœuvres without danger to the aviators or to the troops. It is evident that the instructors should be selected from amongst the officers.

In conclusion, the dirigibles in France are destined, without doubt, to render great service to the national defence, and the machines heavier than air will in the near future add greatly to the means of communication now existing in the army. The aeroplanes at present in use may render useful service in war, but only to a limited extent since they are deficient in the requisites necessary for military purposes. Under these conditions it is indispensable that the military administration should consider seriously the solution of these problems, in which the services for war are particularly interested.

EDWARD T. THACKERAY.

Digitized by Google

CORRESPONDENCE.

A SPANISH WINDLASS.

SIR,

In the *Scientific American* of April 16, 1910, there appeared a short article on a "Spanish Windlass" with a sketch as shown in *Fig.* 1. The windlass simply consists of two spars or pickets, one, *A*, vertical, and one, *B*, held horizontally against it. A rope is fastened from the weight to be moved to an anchorage, the windlass put up on the line of the rope, and a bight of the rope taken round *B*. The weight is moved by walking round on *B*. No lashing is required. The toe of *A* moves towards the anchorage as the weight is pulled in.

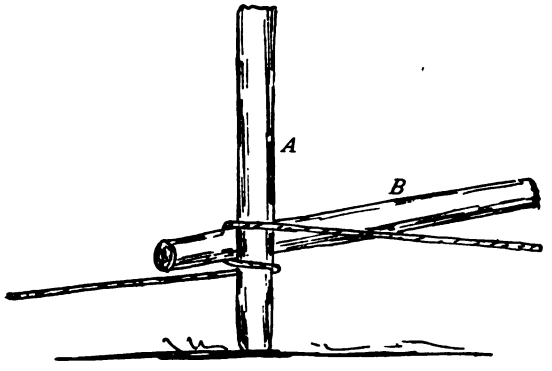


FIG. 1.

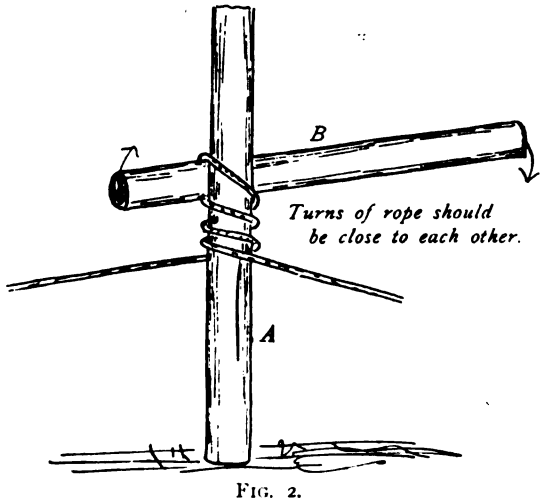


FIG. 2.

Digitized by Google

This improvised windlass will be found exceedingly useful. Th following points should be noted :—

(1). The rope on both sides, to anchorage and to weight, must com away from *A* on the same level, below *B* for choice, as shown in *Fig.* 2 Otherwise the moment set up prevents *A* being held vertical. It wi be found that with a little adjustment, the ropes wind themselves roun *A* absolutely correctly.

(2). The windlass must be exactly between the weight and th anchorage.

(3.) *A* must have a blunt end, otherwise it will bore into the ground and not move along. An occasional kick from the man holding it i usually all that is required to keep it in place.

(4). The ground must be fairly hard.

Yours faithfully,

A. L. PARIS,
Capt., R.E.

The Editor, *R.E. Journal.*

BOOKS RECEIVED.

MOTOR BOATS SIMPLY EXPLAINED. By John Douglas. 1s. Percival Marshall & Co., 26—29, Poppin's Court, Fleet Street, E.C.

WINDMILLS AND WIND MOTORS; HOW TO BUILD AND RUN THEM. By F. E. Powell. 6d. Percival Marshall & Co., 26—29, Poppin's Court, Fleet Street, E.C.

THE WAR OF SECESSION, 1861—1862; BULL RULL TO MALVERN HILL. By Major G. W. Redway. 5s. Swan, Sonnenschein & Co., 25, High Street, Bloomsbury, 1910.

THE ARMY ANNUAL AND YEAR BOOK, 1910. Edited by Major B. F. S. Baden-Powell and Lieut.-Colonel H. M. E. Brunker. 7s. 6d. Wm. Clowes & Sons, Ltd., 23, Cockspur Street, S.W.

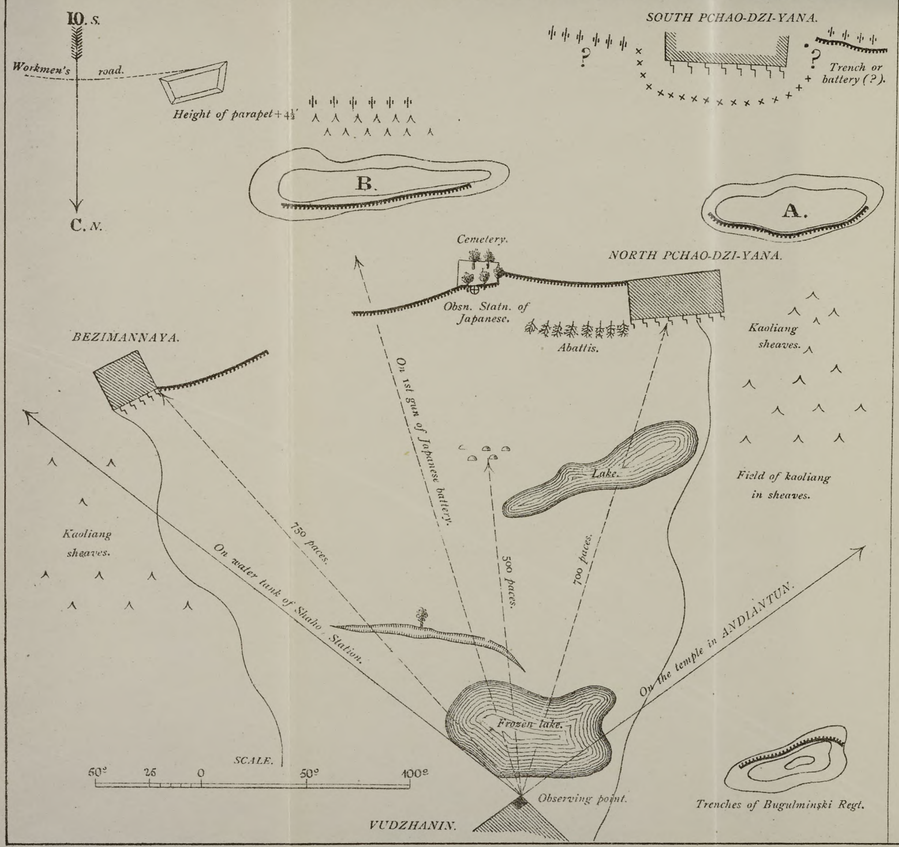
LOGARITHMIC LAND-MEASUREMENT. By J. Wallace. 5s. E. & F. Spon. Ltd., 57, Haymarket, London, 1910.

THE CONSTRUCTION OF A HOUSE. Being the Study of Building Construction presented by means of 40 plates containing plans, elevations, sections. and detail drawings, with descriptive text, of a design for a country house, together with motor house and chauffeur's lodge. By Chas. Gourlay. 6s. in portfolio; 6s. 6d. bound. Batsford, 94, High Holborn, W.C.

Digitized by Google

THE RECONNAISSANCE OF A FORTIFIED POSITION.

SURVEY SKETCH IN RECONNAISSANCE OF JAPANESE POSITION TO SOUTH OF VUDZHANIN.



NOTES.

(1). Observing point in VUDZHANIN native house

(2). Clearly visible 75 loop-holes in north wall of NORTH PCHAO-DZI-YANA and 25 loop-holes in wall of BEZIMANNAYA.

(3). Trench on knoll A with loop-holes.

(4). Single shots heard from cemetery, where the enemy has an observation station.

(5). Enemy's trenches are of full profile, *i.e.* men moving in trench not visible. Height of parapets + ½ to ⅔ arshins (*i.e.* 1′ to 1½′).

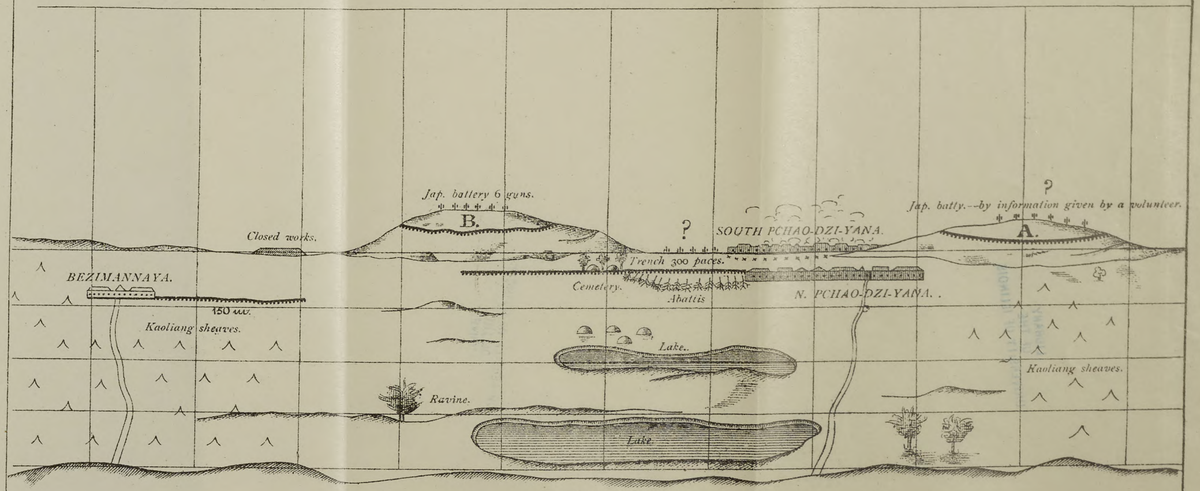
(6) Trenches of Bugulminski Regt shelled by occasional Shimoze fire from battery behind knoll B; battery masked with kaoliang but dust and flashes seen.

(7). To S.E. of B there is a closed work. Men seen carrying beams for blindages (?).

(8). Fire of SOUTH PCHAO-DZI-YANA impedes reconnaissance. Some buildings and wire entanglements visible.

Date and signature.

VIEW OF JAPANESE POSITION TO SOUTH OF VUDZHANIN.

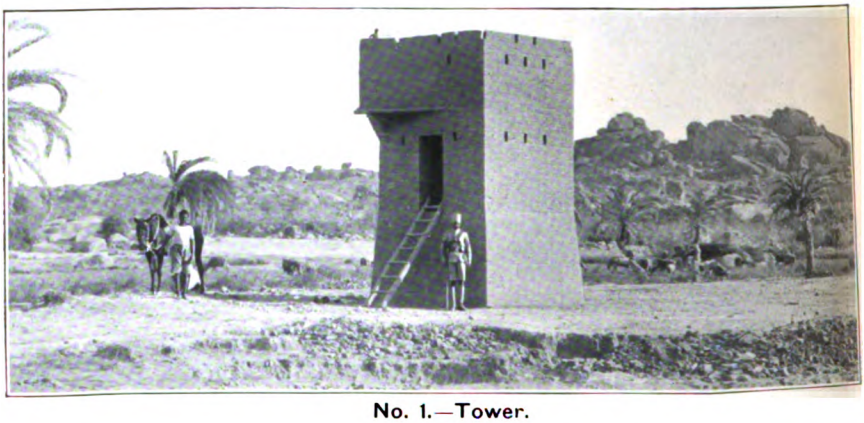


Point of direction—the cemetery (Jap. obsn. station). *Point of observation.* *Date and signature.*

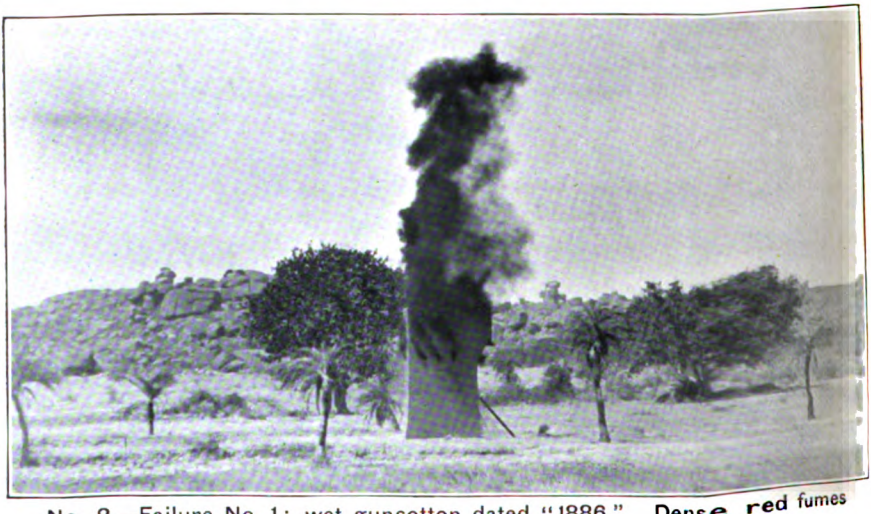
Digitized by Google

Digitized by Google

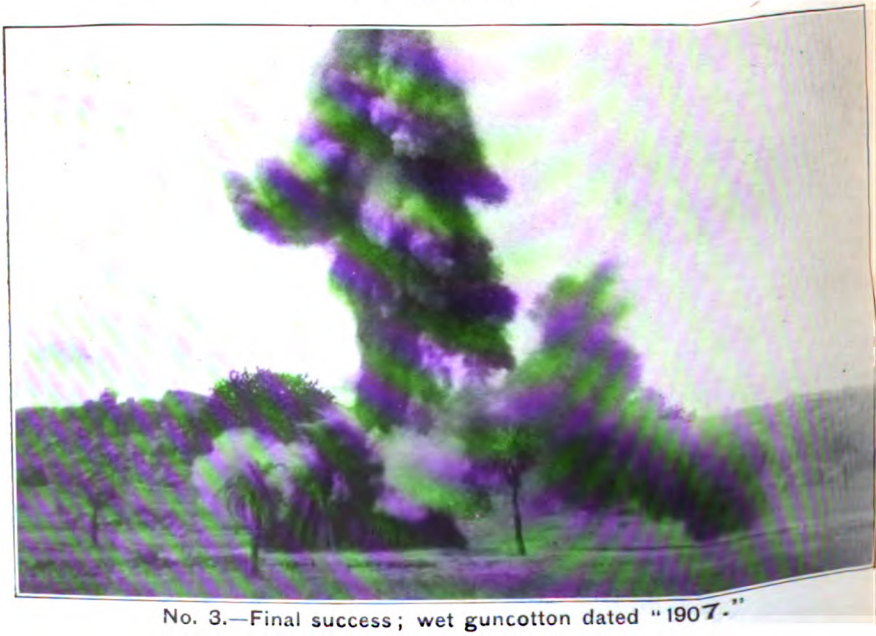
Digitized by Google



No. 1.—Tower.



No. 2.—Failure No. 1; wet guncotton dated "1886." Dense red fumes of NO_2 evolved.



No. 3.—Final success; wet guncotton dated "1907."

Digitized by Google

SOME REMARKS ON WET GUNCOTTON.

By Bt. Major R. L. McClintock.

While instructing Infantry and Cavalry Classes in the art of demolition, the writer has frequently encountered the apparently widespread idea that wet guncotton is so stable and reliable an explosive, that any failure on its part to detonate properly is entirely the fault of the maker-up of the charge. Consequently, the misbehaviour of any wet guncotton used in such demonstrations, serves to supply the usual merry jest at the expense of the operator in particular, and the Corps in general.

It is an unhappy fact, however, that wet guncotton which has been stored for a long period in a tropical climate becomes unreliable, and is, in course of time, as likely to burn as to detonate properly, and this no matter how tightly the primer may be in contact with it, and however efficiently the latter may explode. This statement will probably be heartily endorsed by any R.E. officer who has had the misfortune to come across any of the very old wet guncotton to be met with sometimes in India. To quote an extreme case, the writer was recently told by an officer just back from delivering a course of demolition lectures at various garrisons on the N.W. Frontier, that about half the wet guncotton given him for the purpose from one local magazine could not be detonated under any circumstances.

Now, the failure of a charge in peace is at worst a matter of a jibe at the operator, but in war it is another story. On a frontier campaign it may mean the delay of an hour in the retirement of a hard-pressed rear guard, or the abandonment of the demolition for which, perhaps, the day's operations had been undertaken.

The writer had been aware for a long time of this failure of old wet guncotton, but its extreme undesirability was strongly brought home to him early in the present year, the occasion fortunately being the peaceful one of an Indian field day. The attached photos illustrate the events.

The general idea was the forcing of a defile, the destruction of a frontier tower (previously built for the occasion, *Photo* 1), and the withdrawal of the force on the completion of the demolition. On the appointed day, the defile having been duly forced and the heights beyond occupied, the Sappers and Miners engaged the tower. The charge (21 lbs.) was placed in the orthodox way in a hole excavated in the raised floor of the tower, fully tamped and provided

Digitized by Google

with duplicate firing arrangements. The wet guncotton used was part of the service equipment of the Sapper and Miner Company concerned, and the slabs bore the impress of "1886." The fuzes were duly ignited but, although the explosion of the primers was distinctly audible, the wet guncotton failed to detonate, and only decomposed instead with the evolution of dense volumes of dark red nitrous oxide (*Photo* 2). Again a similar charge (the remainder of the same box of wet guncotton) was placed and fired in precisely the same manner—and with a precisely similar result. A third effort was made with some new wet guncotton (dated "1907") borrowed from another unit, and the tower at last successfully demolished (*Photo* 3).

Now, had this been service, and the same wet guncotton have been used, the same failures would have followed. Whether any further disasters would have ensued it is impossible to say, but the probability is that this protracted delay would, quite possibly, have prevented the column from reaching its proper camp that night.

It is surely desirable, therefore, that the question of the deterioration of wet guncotton in tropical climates should receive expert attention, and that all wet guncotton of more than a certain age be cast as being untrustworthy, or returned to the laboratory for testing. What that age is, the writer has not sufficient experience even to suggest, but if ordered on service he would without doubt make a strong effort to get rid of all his wet guncotton of more than 15 summers to somebody else.

It is practically impossible for the O.C. of a unit to carry out any periodical tests of the reliability of his wet guncotton, short of opening each box on his charge and actually firing one of the slabs. To open, however, a hermetically-sealed tin-soldered case of wet guncotton for such test, and then reseal it in the only available manner with a tape and varnish makeshift is hardly practicable in a hot climate, and would only add to its chance of being useless when really required.

Digitized by Google

A FIELD COMPANY AT TRAINING AND MANŒUVRES.

By MAJOR A. F. SARGEAUNT, R.E.

COLONEL BUCKLAND'S article in the May number of the *R.U.S.I. Journal* has done much to enlighten officers of other branches of the Service on the use of engineers in the field; and a memorandum on the employment of divisional engineers by Colonel Milne (General Staff, 6th Division), has further assisted infantry brigadiers in solving the question as to the best way of employing engineers under their command.

During brigade training this year (when the 12th Company, R.E., was attached consecutively to the 16th and 18th Brigades), and during divisional training, and manœuvres, there was always a determination to make the most of the engineers; but at the same time a great deal still depends on the initiative of the O.C. Company.

If the section commanders and the sappers generally are to take an interest in the day's proceedings, it is necessary to explain to them from time to time the outline of the scheme and the trend of events, so that they may understand the reason for different movements; otherwise it seems to them that they do many miles of aimless marching.

Brigade training was carried out from standing camps so that there was no scope for employing R.E. on the line of march, but this was not the case in attack and defence schemes.

To take a concrete example:—

R.E. in Defence.—Before taking up a defensive position, R.E. officers rode on ahead of the column with the staff officer told off to select the position, and the R.E. officers acted as his technical advisers; on arrival of the troops, the tool carts were sited in a safe central position behind the line of defence, and the company was divided up and allotted to the different sections for the purpose of assisting in strengthening the position.

The G.O.C. then decided to retire to a second position which was indicated to O.C. Company on a map; the Sappers were withdrawn and taking the tool carts along with them they retired to the chosen line in order that they might select the best line of defence, and, having selected it, commence strengthening it.

R.E. in Attack.—The proper employment of R.E. in attack is most difficult at manœuvres; everything moves so quickly, and so much ground is covered in so short a time owing to the absence of shells

Digitized by Google

and bullets, that there is as a rule no time for any preliminary reconnaissance. On one occasion a temporary bridge was required to facilitate the attackers crossing a river, but generally the main objective of engineers in attack at manœuvres, is to reach the attacked position as soon as possible in order that it may be defended against a counter-attack.

Both in divisional training and at the Irish Command Manœuvres the R.E. companies were nearly always allotted to infantry brigades, and worked under the orders of brigadiers.

R.E. on Line of March.—The 12th Company, R.E., during the advance into the manœuvre area was with the 17th Infantry Brigade, which first acted as a flank guard and then as an advanced guard, and whether with the advanced guard or the main body of this force the R.E. were always kept well to the front, which was very necessary as it always fell to their lot to make watering arrangements on arrival in camp, no arrangements having been made beforehand. The necessity too of R.E. being well to the front was exemplified during divisional training when a bad piece of road was encountered and the advance was checked till a deviation had been made.

Bridging equipment was carried during Irish Command Manœuvres as it was thought that it would be necessary to bridge the River Barrow, but thanks to the energy and zeal of the cyclist companies the road bridges were secured against demolition by the opposing force. A light bridge was however ordered to be constructed by the R.E. companies across the Barrow, but it did not prove to be of any use; the making of this bridge turned out to be somewhat unfortunate, as, had the 12th Company taken their bridging equipment with them into camp, the construction of a raft to connect the two sections of the outpost line would have been most useful and would have saved a détour of many miles.

More cyclists with the company would have been a distinct advantage, as a party can then be pushed on with the tool carts, or without tool carts when it is a question of hasty demolition. A party of R.E. cyclists with demolition stores accompanied the infantry cyclists in their advance to the Barrow, in case events should make the destruction of the river bridges necessary.

The gratifying aspect of the manœuvres was the desire of brigadiers to have R.E. attached to their force, and the manner in which they used them not only when practical work had to be done, but when work could only be executed in theory.

Digitized by Google

GIBRALTAR UNDER MOOR, SPANIARD, AND BRITON.

(*Continued*).

By Col. E. R. Kenyon, R.E.

The British Capture of the Fortress (1704).

In 1704 Admiral Rooke once more visited Gibraltar, but this time he came, not to take refuge under its guns, but as the foe of the reigning prince from whom he was destined to wrest this Key of the Straits. With him came a military force under the command of Prince Henry of Hesse-Darmstadt. On July 21st (O.S.)—or August 1st (N.S.) they anchored in the bay and landed a force of about 2,000 men on the isthmus under the Prince ;—not at Punta Mala as stated by Ayala.* The garrison, which consisted of only 150 men was then distributed at the Old Mole, the covered way of the Land-port, the New Mole, and the Castle.† The details of the attack and capitulation are somewhat variously stated by different historians, as indeed is usually, and not unnaturally, the case in dealing with the confused and rapidly changing events of war.

James collects the accounts of various authorities and it seems that the following is a fairly correct statement of the course of events :—The Prince having summoned the fortress to surrender and having been refused, the Admiral issued orders for a bombardment by the fleet, which was carried out on the 23rd July (O.S.) for about six hours. Rooke then seeing that the works defending the South Mole were much damaged and were evacuated by their garrison, signalled to Capt. Whittaker of the *Nottingham* (60 guns) to take possession of them. Capts. Hicks and Jumper of the *Yarmouth* and *Lennox* (both 70 guns), however, also reading the signal and being nearer inshore succeeded in landing first and getting into the Tuerto Tower at the landward end of the Mole. An explosion took place there which killed 2 lieutenants and 40 seamen and wounded 60.‡ The captains,

* Drinkwater, p. 9, and Montero, p. 260. Colonel Skinner in an official report of February 24th, 1758, to the Board of Ordnance states that the attacking fleet consisted of 54 English and Dutch ships and the landing force of 2,000 Marines: British Museum Add. MS. 10034.

† Montero, p. 264.

‡ Colonel Skinner in his report of February 24th, 1758, states that they landed between the New Mole and the 8-gun battery where the wall was not over 10′ high, scaled it, and pursued the Spaniards back into the fort which they had evacuated; and that the explosion was due to a pistol shot fired by one of the seamen at a party who were fleeing into the magazine.

Digitized by Google

however, kept possession of the platform of the fort and were reinforced there by Whittaker. They then moved northwards along the line wall till they came to a small work armed with eight guns which they took. Rooke now summoned the place again and received its capitulation on July 24th. Montero places the capitulation two days later, but this is probably due to a difference in time between the occupation of the gates by the British at the commencement of the negotiations for surrender, and the actual signature of the capitulation. It appears that a naval detachment was also landed at some point further to the south (said by James, Vol. II., pp. 311 and 328, to have been at Europa Advance which was afterwards made more difficult by scarping); and there is a story (repeated by James, and many English writers) that these men captured a party of women who had gone to pray at the Shrine of "Our Lady of Europa." Burnet who is very hostile to Rooke attributes the surrender entirely to the wish of the Governor to rescue these women; and Skinner states, on the authority of "Commissioners Faulkingham and Geddes who were both Lieutenants of Men-of-War and landed on that attack," that the captors threatened to march with the women and children in front.* Montero, however, states (p. 266) that contemporary accounts show that there is no foundation for this story,† and we may well hope for the credit of British arms that he is right. The women had indeed gone to the Shrine with old men and children, but fearing to be cut off had returned to the town, suffering some losses on the way from the fire of the ships.‡ The 8-gun battery captured by the combined landing parties had become one of 10 guns in the time of James, the two additional embrasures having been opened in 1753,§ but in Drinkwater's time had again reverted to eight. It still commemorates the assault by bearing the name of "Jumper's Bastion." Montero (p. 266), following Ayala, erroneously makes Whittaker to have landed on the North Mole and represents the explosion, which they attribute to a mine intentionally fired by the garrison, as having taken place in the "Leander" Tower at that place. The plan in the pamphlet *Reasons for Giving up Gibraltar* (1749) names the work at the inshore end of the New Mole "Fort of the New Mole, by the seamen called Jumper's Battery." The same plan also shows (without any special name) the 8-gun battery on the line wall; and it may

* Burnet, p. 389, and Skinner's Reports of February 24th, 1758, and August 14th, 1769: British Museum Add. MS. 10034.

† He refers to the priest, Don Juan Romero, who remained in the town to protect his Church of St. Mary the Crowned.

‡ Possibly the following entry in a "Journal of the Taking of Gibraltar" may show how the story originated as to the surrender being due to the women:—This journal says that it was in consequence of "the enemy finding themselves weak and also being overcome by the Prayers and Importunitys of the Women." British Museum Add. MS. 10034, p. 175.

§ James, Vol. II., p. 308.

Digitized by Google

well be that Jumper's name was originally given to the fort which he first captured and where his heavy losses were incurred, and was afterwards transferred from the ruined and reconstructed work to the battery whose capture was the final act of war prior to the surrender.

After the capitulation Rooke sailed away, but the Prince remained as Governor for the British with 2,000 men, chiefly supplied from the Navy, and is commemorated by Hesse's Demi-Bastion flanking the Landport, of which gate he was placed in possession after Rooke's summons on July 24th. The Tuerto Tower, which appears in an engraving of the battle between the Dutch and Spaniards in 1607 as a round tower of no very considerable dimensions, had been rebuilt and enlarged in 1620 when it was given "all the size and importance of a castle with suitable artillery and had its own Governor." * The body of this fort was formed by a pentagon of Moorish foundation. Its site is now occupied by the Alexandra casemates (known until recently as "Alexandra Battery.").

After the capitulation, the British garrison plundered the houses and wantonly desecrated the churches, apparently making the Shrine of Our Lady of Europa a special object for their hostility,—no doubt on account of its valuable contents and also its reputation as the principal shrine of the place. They are said,† after plundering it of its jewels, to have cut off the head of the Virgin's figure and to have flung it away among the rocks.‡ The whole Spanish population (which numbered some 6,000) left the place "except one woman and some sick old men," and the priest Romero who says that some 12 persons in all remained. The 75 nuns of Santa Clara fled through the woods of Almoraima to Jimena, where they were sheltered in the Franciscan Convent and whence they were afterwards distributed amongst the convents of their order.§ The convent of Santa Clara stood on the site now occupied by the Cecil Hotel.‖ It belonged to the Franciscans and was founded in 1587 in the private houses of its foundresses; and its first abbess was a relative of theirs, Leonor Gentil, who came from Seville¶ and whose name is still recalled (although perhaps not intentionally) by "Leonora's Cave." Romero himself remained in order to protect his Church of "St. Mary the Crowned" and its property; and subsequently he busied himself in gradually, with the assistance of others, smuggling out of Gibraltar various sacred images, etc., among which is said to have been the mutilated figure from the Chapel of the Virgin of Europa, which was restored and enshrined in Algeciras, where it remained until 1864 when

* Montero, p. 276.
† Montero, p. 268.
‡ Montero, p. 268, on the authority of the priest Romero, but others say it was the child's head which was cut off.
§ Montero, pp. 269 and 278.
‖ Dewing.
¶ Montero, p. 278.

Digitized by Google

it was brought back and entrusted to the Loreto Sisters until 17th May, 1866, when it was carried in solemn procession through the streets to a new chapel prepared for it at St. Bernard's College. Some of the inhabitants fled to Ronda, Cadiz, and Malaga, but others took refuge at the neighbouring sanctuaries. Of these the most numerous group betook themselves to the Hermitage of San Roque; others to that of San Isidro, thus founding the town of Los Barrios; while a third party fled to that of La Palma within the boundaries of the old town of Algeciras which was thus refounded.*

Probably a few of the exiles soon returned, for in a letter of November 22nd, 1712 (N.S.), Colonel J. Bennett states that after the capitulation about 30 families and six clergymen remained, "but the whole number of men, women, and children did not exceed 70."†

Montero (pp. 274, etc.) gives a description of the place at the time of its loss by Spain. The town consisted of the Castle and three wards, Villa Vieja, Barcina, and La Turba. The Castle with Villa Vieja formed the ancient Moorish city. Villa Vieja and Barcina were walled and had their respective gates and towers. La Turba was not walled separately but was included within Charles V.'s Wall and was coterminous with the city boundary. It was the southern part of the town and received its name on account of the wretched class of people by whom it was inhabited. Barcina was the central part and was the richest and most populous.‡

The Spaniards lost no time in attempting to recover their lost fortress; and on September 5th (N.S.) the twelfth siege was begun by the allied forces of France and Spain, consisting of 9,000 Spaniards, 3,000 French, and 12 French ships.§ An English squadron under Leake however arrived and secured the command of the bay. Both the attack and defence were carried on with great vigour. It is mentioned‖ that among other steps Prince Henry mounted guns on the Devil's Tower and formed the inundation which is shown by a plan in James to have taken the form of an irregular morass until 1731. The most notable incident of the siege was the gallant attempt of Colonel Figueroa with 500 Spanish soldiers to surprise the place, under the guidance of a local shepherd who led them by the east side of the Rock past Catalan and Sandy Bays, and thence by

* Montero, pp. 280—325. In the *Gibraltar Chronicle* of October 8th, 1885, an interesting article by Don F. M. Montero which appeared in the *Epoca* of October 4th is quoted, describing the exodus from Gibraltar and the growth of San Roque, in which he mentions that at first the people settled amongst their own vineyards and gardens in the district in much misery before collecting into a township.

† "Some Remarks concerning Gibraltar," British Museum Add. MS. 10034. on p. 274 of which he gives a list of those who remained.

‡ Montero, p. 122.

§ See Montero, pp. 282—292.

‖ Montero, p. 283.

Digitized by Google

a path which ultimately brought them to St. Michael's Cave where they slept that night. The path was subsequently scarped away by the British and its exact route is not now known. The next morning they surprised the guard at the Signal Station and killed them all and then took post (according to Spanish accounts) at the "Silleta" about 100 yards south of St. Michael's Gate (or, according to English accounts, at Middle Hill) in order to assist a storming party which was to have been sent from the camp to scale the precipitous cliff at that place. This party however never appeared. The alarm was given to the garrison by a boy who had come up with food for his father at the Signal Station where he found the whole guard killed. A force was at once sent up and after a fierce fight it destroyed or took the entire Spanish detachment except the shepherd and a few others who succeeded in effecting their escape. The English version is borne out by the "Journal of an officer who was present during the whole siege"* who says "500 Spaniards attacked the Middle Hill"; while Ayala and Montero base their accounts on that of the priest Romero. James (Vol. II., p. 313) also states that it was at Middle Hill that the Spaniards "made the guard prisoners" and that the rocks there had been "within these few years" "scarped, with a wall raised, a sergeant's guard and a parapet" for 20 muskets "so that there is no danger of an escalade." Another contemporary account is given in the "Journals of the Sieges of Verue and Gibraltar" stating that 500 of the besiegers "found means to climb up the rocks and by the help of rope ladders and other things got upon the mountain through a way thought inaccessible; . . . 200 were killed on the spot and 180 with a colonel, lieutenant-colonel, a major, 30 captains, lieutenants, and ensigns were taken prisoners, and the rest who endeavoured to make their retreat by the same way they came fell down the rocks so that few, if any, returned to the camp."† The officer previously quoted, records that Prince Henry himself was wounded in this fight. Probably the apparent discrepancies between the accounts are due to the term "Middle Hill" having been at that time applied to the whole of the central height between the two deep depressions which cut it off from O'Hara's, or Sugar-Loaf, Hill on the south, and from the Rock-gun summit on the north.‡ The very detailed Spanish account describes—as given

* Quoted by Sayer, p. 138.

† An undated MS. (apparently of about 1767) now in the possession of Major Harrison, Secretary of the R.E. Institute, states that "At the end of this Guard called the Rock Guard is the place from whence they say the General or Chief Officer of the En: threw himself down in 1705, & his bones are still reported to lye in a Cliff halfway between yt & the Queen's Battery on the N. end of the Rock, after having been disappointed of Storming the Garrn."

‡ This was evidently the use of the name "Middle Hill" so late as 1868 for Professor Busk in his paper on the Caves, says "The middle portion, 'Middle Hill' or Signal Station, forms the central eminence."

Digitized by Google

above—an attack on the southern end of what would on this supposition naturally be described by English writers as "Middle Hill"; and the plan in Ayala confirms this by marking the Shepherd's Path as in the dip between Signal Hill and O'Hara's.

During the siege the Spanish trenches were pushed right up to the inundation (or morass, as it then was*) and between it and the Rock. The bastion of San Pedro (now called Hesse's Demi-Bastion) was destroyed and both the Landport curtain and the King's Lines were breached.† On February 7th (N.S.) an assault was delivered on the work called "El Pastel" by the Spaniards and "The Round Tower" by the English. The tower (of which only the foundations now remain) was taken and held for about an hour, but finally the assault was repulsed.‡ Ultimately, the British squadron having left the bay, the French squadron which had previously evacuated it, returned. The Prince immediately called on Admiral Sir John Leake to again come to his aid. Leake promptly returned from Lisbon and fought an action which resulted in the capture of three French ships and the burning of two others, and was immediately followed by the raising of the siege which had lasted eight months. "During this siege," says Colonel Skinner in his report of 24th February, 1758, "two guns were got up to the Rock and called it Willis's Battery":—afterwards called Queen's Battery; and in a MS. of 1705 which was formerly in the Royal Artillery Record Office it is stated that the battery received the name of Willis's because the man who was most energetic when it was first armed bore that name.§ During this war the staunchest Spanish supporters of the Archduke Charles' claim to the throne were the Catalonians or Catalans; and it is therefore not surprising that we find them providing a contingent to assist in the defence of Gibraltar. Their memory was preserved by a "Catalan Battery" near the "Salto del Lobo" eastward of Queen Charlotte's Battery and the Moorish Castle, "so called," says Colonel Skinner, "from a company of Catalan Miquelets who served in the "siege of 1704 and guarded that part of the Rock."‖ Green in his report had erroneously stated that "Catalan Battery" was the original name of "Queen Charlotte's" which was the nearest battery to the

* In British Museum Add. MS. 24939, which is a plan of the town with the siege works of 1727 by J. Emden, it is shown as a "Morass about 3' deep dry the end of May."

† Montero, pp. 285, etc., James, Vol. II., p. 192, and Drinkwater, p. 14. The ruinous condition to which the northern defences were reduced is described in a report dated 1st January, 1705 (N.S.), in British Museum Add. MS. 10034, p. 162.

‡ Journals of the Sieges of Verue and Gibraltar.

§ Duncan's *History of the Royal Artillery*. The papers have been removed to the Record Office in Chancery Lane and this document cannot now be traced.

‖ Skinner's Report of 30th August, 1770, in British Museum Add. MS. 10034, pp. 206–7.

Digitized by Google

Castle; and Skinner corrects this mistake adding that Queen Charlotte's was erected just before the siege of 1727. In order to reap the fruits of Catalan support an expedition was organized in 1705 against Barcelona under the command of the Earl of Peterborough which was accompanied by Charles himself. The fleet called at Gibraltar where Prince Henry joined it. The expedition succeeded in its object of capturing Barcelona, but Prince Henry was killed in the assault on Fort Monjuick, the capture of which was a necessary preliminary to that of the city itself.

On 19th February, 1706, Queen Anne proclaimed Gibraltar a free port which evidently led to a considerable influx of population; for in a letter of November 22nd, 1712 (N.S.), bitter complaint is made that a short time after it was declared a free port many people came to live there and paid high rents, and that the garrison was removed out of their quarters and put into the very worst and ruined houses to make room for strangers.*

Gibraltar under the English.

In February, 1712, the war was terminated by the Treaty of Utrecht by the tenth clause of which Gibraltar was definitely ceded to England by Philip V. who granted "the full and entire ownership of the place together with its castle, port and the defences and forts which belong to it, giving the said ownerhip to be held and enjoyed absolutely with full rights and for ever without any exception or hindrance, but without any territorial jurisdiction and without permitting any Moors or Jews to reside within its limits, nor allowing Moorish ships to enter its port."†

The stipulation as to the Jews and Moors cannot have been long observed, for we find both mentioned during the siege of 1727. "The Jews were not a little serviceable; they wrought in the most indefatigable manner, and spared no pains when they could be of any advantage, either in the siege or after it."‡ The same authority mentions a plot to surrender the town of which Moors and Jews were accused. Two Moors were convicted and executed; and their skins were nailed on the town gates.§

"Hargrave's" Barracks preserve the name of Lieut.-General

* "Some Remarks concerning Gibraltar humbly offered by Colonel Joseph Bennet" in British Museum Add. MS. 10034. Lists are given of the old inhabitants who had remained after the capture and of those who were paying rents for houses: pp. 274, etc., of the MS.

† The whole clause is given by Ayala, p. xxxix. of the Appendix.

‡ *An Impartial Account*, etc.

§ Montero states (p. 439) that almost all the Jews in Gibraltar are descendants of those expelled in 1492 from Spain who took refuge in Barbary and other parts of Africa, whence they returned to Gibraltar, and that they use words of the ancient Castilian language, undoubtedly learnt from their ancestors.

Digitized by Google

W. Hargrave who was Governor in 1739 when these buildings were converted into Barracks and who was Commandant of the troops when the siege commenced in February, 1727. A monument to him by Roubiliac stands in the south aisle of Westminster Abbey. During the siege Lord Portmore was Governor and General Clayton Lieutenant-Governor with a garrison which at first numbered 1,502 men but was afterwards raised to over 5,000.* The Spanish trenches (which commenced with a parallel from the middle of the Spanish frontier line to the Devil's Tower) again reached to the morass; and the besiegers attempted to effect a lodgment by mining from a cave under Queen Anne's Battery (shown on the 1745 plan as "formerly called Willises") which mounted 12 pieces and was doing them much harm. Its site is now occupied by the obsolete "Princess Royal's" Battery. The mine was driven by two galleries† and penetrated 70′ out of the total 134 needed to gain the point aimed at‡ but was never fired and after the siege was built up. After five months, hostilities were suspended as negotiations for peace were in progress, but it was not until June, 1728, that the blockade was actually raised.

The name of "Camp Bay" dates from this siege, a regiment having been encamped above it on Rosia Parade which then extended as far south as the rear of Parson's Lodge Battery.§

Another name which is also a memento of this siege is that of "Forbes'" or "Lord Forbes'" Battery as it was originally called. Lord Forbes was a naval officer and, later in life, a diplomatist, who assisted on shore and afloat during this siege. By him the first gun was fired in the defence from the Old Mole.¶ In Colonel Guise's Diary we find under date March 15th "Lord Forbes brought in a Spanish man-of-war." The *War Office Journal* records this as occurring on March 14th and mentions that he sailed again for Lisbon on March 16th. He had served as a midshipman on the *St. George* at the capture of Gibraltar and afterwards as A.D.C. to the Prince of Hesse-Darmstadt on shore. In 1734 he obtained his flag rank and also succeeded his father, the second Earl of Granard, in that title.** Forbes' Battery is mentioned in the *War Office Journal* as armed with two iron 6-pounders, and its casemates are described as "two divisions, each 20′ × 10′ for 60 men sitting"—somewhat closer packing than would suit modern ideas!

Much damage was done to the buildings in the northern part of

* James, Vol. II., p. 237.
† Guise's Diary.
‡ Montero, p. 311.
§ Plan in James.
¶ James, Vol. II., p. 321.
¶ *War Office Journal*, under date February 10th.
** *Dictionary of National Biography*, Vol. VII., p. 393.

Digitized by Google

the town, or Villa Vieja, which ultimately resulted in the clearing of the present site of the Casemate Barracks. The officer who wrote the *Impartial Account*, in his description of the preparations for defence, says of Colonel Kane "All his designs proved advantageous to the Place but one; being prevailed upon to pull down the old gateway leading from the Grand Battery, he exposed a part of the town to the Enemy's shot . . . and a hundred houses were by that means laid in rubbish." James* says that the houses which stood on the esplanade, (as the Casemates site was then called) "being in ruins from the bombs thrown by the enemy in 1727, it was thought more advisable to clear the rubbish away, which was done in 1731, to widen that part of the Old Mole called the bomb battery," *i.e.* the rubbish was removed outside the walls and employed for this purpose. It was probably at this time that the ancient parish church of Santiago was removed in whole or in part.

The obsolete "Lady Augusta's" Battery, near the Sandpits, preserves by its name an interesting record both of the change which has taken place in the titles assigned to Royal ladies, and of the unfortunate relations which existed between George II. and his eldest son Frederick, Prince of Wales.

Originally the defences of which this battery forms a part were called "The Princess of Wales Line" which included three batteries "Lady Elizabeth's," "Lady Augusta's" and "Prince Henry's,"† being named after three of Prince Frederick's children. Horace Walpole records under date June 27th, 1773, that this Prince "for popularity had affected to call his daughters the Lady Augusta, the Lady Elizabeth, etc., but the late King" (George II.) "had never approved or admitted that appellation, and it had been dropped by the Princess herself after her husband's death."‡ By the use of this title the Prince of Wales had reverted to the Tudor and Stuart custom. The daughters of James II. were known as "the Lady Mary" and "the Lady Anne" until they became Princesses by their marriages with the Prince of Orange and Prince George of Denmark.§ The Lady Augusta married the Duke of Brunswick and was the mother of that Duke who fell at Quatre Bras on June 16th, 1815.

The half century between the siege of 1727 and the next saw many changes and improvements in the fortifications. Immediately after the siege they were naturally repaired and strengthened; and a plan in the *Impartial Account* (1728) shows the "Old Mole, ye head

* Vol. II., pp. 304, 305.

† See list following the War Office MS. diary of the siege of 1727 in the Garrison Library, p. 176.

‡ *Last Journals of Horace Walpole*, Vol. I., p. 240. Ed. 1910.

§ *Encyclopædia Britannica*, Vol. XIX., p. 738.

Digitized by Google

lower'd* and made 30′ longer than before ye siege." James† gives a full detail of the changes to the fortifications with many dates, and Skinner gives a detailed list of the improvements from 1726–40 dated 20th September, 1770. Prince's Lines, which had been constructed in 1720, were widened in 1731–2 and their casemates were added; a large quantity of earth was removed below the foot of Queen's Lines; the group of Willis' Batteries (named after the Princesses Caroline, Anne, and Amelia, wife and daughters of George II.) was completed in 1732; Hesse's Demi-Bastion was reconstructed in 1730; between 1730 and 1738 the wall from Waterport to South Bastion was repaired, following the line of the old Moorish wall which was in many places left exactly as it stood but covered in by new work.‡ In it were included the "Prince of Orange's" and "Duke of Montagu's" Batteries which were old works improved and re-named.§ The Duke of Montagu's Battery (now converted into Montagu Bastion) preserves the memory of the short-lived Duchy of Montagu, which was created by Queen Anne. The London house of the first Duke became the British Museum, but has been entirely obliterated by the existing buildings on its site. The second duke, who succeeded him in 1709, was the Duke of Marlborough's son-in-law and was Lord High Constable of England at the coronation of George I., and carried the Sceptre and Cross at that of George II. He died in 1749 when all his honours became extinct. His son-in-law, the Earl of Cardigan, was however created Duke of Montagu in 1766, but the Duchy finally expired with him in 1790.‖

In 1731–4 the morass was converted into an inundation by being dug out to a depth of 2′ below low-water mark, with many deep pits in it. A plan in the Gibraltar Garrison Library shows both the morass and the inundation,¶ the latter extending further east than the original morass.

In 1736 the Contractor to the Victualling Office built the wharf called the "Ragged Staff" which is now merged in the Ordnance Wharf. The reason for the adoption of this name is not recorded. In a plan of 1750** it is spelt *Wragged Staff.;* and it seems just possible that the name is an anagram of that of Sir Charles Wager, First Lord of the Admiralty in 1736, suggested by the shape of the original wharf.

* Colonel Skinner's report of 14th August, 1769, states that it was lowered by 5′.

† Vol. II., pp. 301, etc.

‡ Skinner's Report of 14th August, 1769, states that before this reconstruction the houses joined the old Line Wall which only provided a passage 4′ wide.

§ Both these works were further enlarged between 1770 and 1779.

‖ Burke's *Extinct and Dormant Peerage.*

¶ No. 13 the plan dated 1738.

** Add. MS. 21576 at British Museum.

Digitized by Google

While the English were thus steadily strengthening their position the Spaniards were also at work erecting a fort at Punta Mala and the fortified Lines along their frontier which were demolished in 1810, but of which the ruins are still to be seen at Linea; and in 1739 the Spanish Court issued a remonstrance which is quoted by Ayala (Appendix XXXV.) "Although this fortress was given up without any territorial jurisdiction and without any open communication with the surrounding country on the land side, the English require that the distance of a cannon shot should be comprehended, and although it was agreed mutually in 1728 to abandon the posts on which the dispute was grounded (which were, one in front of the Genoese Tower, another near the Rock under the Pastelillo* and another on the east, little distant from the Rock and near the Devil's Tower) yet they have since occupied them without any regard to the Treaty."†

In 1744–5 the Town Range Barracks were built‡ and Skinner records that between 1726 and 1746 "Four Chapels, viz., Lavera Cruze, La Misericordia, the Hospital, and St. Clara were rebuilt for Soldiers' Barracks." In 1756 the cemetery at the North Front was commenced. In a MS. account of "Occurrences at Gibraltar when Lord Tyrawley was Governor in 1756–7"§ it is recorded under date October 30th, 1756, that "Great inconvenience arising from burying in the Red Sands which were almost covered with graves, Lord Tyrawley sent out the Town Major and Camp Colourmen to mark out a Burying Place without Landport towards the Devil's Tower designing that both soldiers and sailors should bury there for the future"; and under date November 1st it is noted "The burials began to-day on the north side." There is however no existing record of any grave earlier than 1804.‖ A map of the 18th century in the British Museum (Add. MS. 34067) shows the "Soldiers' burying place" on the south glacis outside the South Bastion; and no doubt it had extended from there throughout the Red Sands. The Sandpits Cemetery is probably a remnant of the old more widely scattered burial ground, and very probably when the Red Sands were formed into the Alameda, old interments may have been removed there.

During the Seven Years War (1756-63) when England and Prussia

* Probably the same as El Pastel, or the Round Tower.

† It is not quite clear what Genoese Tower is referred to as that name does not appear elsewhere in connection with the North Front, but that there were several towers in that neighbourhood which have disappeared is shown by the names which occur in the tables of distances from various parts of the defences which are given in the *War Office Journal* of the siege of 1727 and in James' *History*.

‡ Note on the 1745 plan.

§ British Museum Add. MS. 23637, p. 44.

‖ The War Department transferred the Cemetery to a Board in 1872.

Digitized by Google

were opposed to France, Austria, and their allies, Gibraltar saw no fighting, but in "Ferdinand's Battery," constructed long afterwards, it has commemorated the great General, Prince Ferdinand of Brunswick, under whom the British troops fought in Germany during a great part of that war, and who led them to glorious victory at Minden in 1759. In 1761 the "Couvre Port Work, covering Landport, was re-formed . . . into a battery for three guns."*

The *War Office Journal* previously quoted records that a party of "330 men per day, composed of Jews, Genoese, etc., was employed for nine days to level the sands upon the isthmus, between the Spanish Hutts and the Inundation, finished January 9th, 1762." In the same year the original Prince George's Battery was constructed for six heavy guns and two howitzers.† In 1766 there occurred a terrific storm during which Green states that about 130′ of the Line Wall were carried away near the southernmost point of Rosia Bay. This part was rebuilt into "Lord Granby's Battery" for five guns; and in 1769 the "Sea Line Wall and the Line of the Coast from Prince William's Battery joining immediately to the south-east angle of the New Mole Fort" received, he says, "in a very particular manner, all kind of repair and reformation as far as the guardroom at Bona Vista," at Camp Bay, etc., the cliffs being scarped and built up and the old walls being rendered more inaccessible.

In 1771 a quaint addition to the defences was made in the shape of "Healy's mortar," which may still be seen near Queen's Gate. It is cut in the solid rock and was intended to be used against landing parties. A full description of the experiments with it is given in Grose' *Military Antiquities*, Vol. II., Appendix 20. The inventor wished it to be fired with 50 lbs. of powder, but the charge actually used was only 27 lbs. with 70 paving stones of from 1 to 1¼ lbs. weight. These were scattered from Ragged Staff to the small Watering Pier which ran out just opposite where the Naval Canteen and Jumper's Well now are; about a quarter of them going 100 yards into the sea. With a charge of 13½ lbs. and 1,220 stones, about 200 passed over the Line Wall.

In the same year the Naval Hospital was built to accommodate 1,000 patients, and was long known as the Cobb, or Dollar, Hospital, on account of its excessive costliness.‡

In the following year (1772) the Company of Military Artificers, which was the beginning of the rank and file of the Royal Engineers, was formed on the recommendation of the Chief Engineer, Lieut.-Col. (afterwards Sir William) Green. Until that year all the fortification work had been done by civil labour (which proved very unsatisfactory)

* Green's Report of 10th January, 1770.

† Green's Report of 10th January, 1770, in British Museum Add. MS. 10034.

‡ Hennen, p. 135.

Digitized by Google

or by mechanics drawn from the regiments in garrison, especially the artillery. On March 6th, 1772, a Royal Warrant was signed creating "The Military Company of Artificers" which subsequently, after passing through the successive stages of "Royal Military Artificers," "Royal Military Artificers or Sappers and Miners," and "Royal Sappers and Miners," became the rank and file of the Corps of Royal Engineers, in the year 1856, this title having up to that time been confined to the officers. From the beginning the Military Artificers were placed under the orders of the Engineer officers. In 1773 Lieut.-General Boyd laid the foundation stone of the King's Bastion, which was built from Green's designs by this infant company and which may therefore be fairly taken as a memorial of General Boyd, who is buried under it in a vault prepared at his express desire and whose epitaph may still be seen on its walls; of Green, the Chief Engineer throughout the Great Siege of 1779-83; and of the birth of the Corps of Royal Engineers, although Engineer *officers* were of earlier date. The casemates of King's Bastion were intended for a regiment of 800 men (Drinkwater, p. 14) and were occupied accordingly*—a sufficient proof to anyone acquainted with the place of the advance which has been made in the housing of our troops since that time. About the same time the "Prince of Orange's" and "Duke of Montagu's" Batteries were enlarged from Green's designs into Orange and Montagu Bastions.

When the foundation stone of King's Bastion was laid General Cornwallis (whose connection with Gibraltar has been commemorated by the name of "Cornwallis Hall" given to one of the most striking features of the Galleries) was Governor; and during his time Windmill Hill also was fortified. He was Governor from 1762 to 1777 when he was succeeded by General Eliott; but was only resident during part of this period, the Government being as usual administered during his absence by Lieutenant-Governors, to which office Boyd was appointed in 1773 while holding the rank of Major-General.

The next great event in the history of Gibraltar was the siege of 1779–1782—"The Great Siege"—which was conducted by the combined forces of Spain and France. The British colonies in North America had declared their independence in 1776 and were waging war against England. In 1777 Burgoyne had capitulated at Saratoga; in December France had recognized the independence of the colonies, openly joining them in the war in 1778; in June, 1779, Spain also joined this alliance; and on the 21st day of that month communication between Gibraltar and the Spanish territory was closed by order from Madrid. On 7th August Lieut. Holloway of the Engineers records in his diary "Began fitting up

* The pay lists of June, 1788, refer to them as "now occupied by the Queen's or 2nd Regiment."

Digitized by Google

Poca Roca's Cave as apartments for the Governor,"* but it does not appear that he ever occupied it. The story of the siege is so fully detailed in Colonel Drinkwater's History and Capt. Spilsbury's Diary that it is unnecessary to repeat it but it is interesting to note that the principal trenches were practically parallel to the Spanish Lines instead of running diagonally across the isthmus as in the previous sieges. The climax came with the great bombardment of September, 1782,† the destruction by red-hot shot of the enemy's floating batteries, and the total defeat of this attack. During the hottest part of the bombardment the Governor, Sir George Eliott, took his post on the King's Bastion while General Boyd took his on the South Bastion, from which he was able to see the fulfilment of the wish he had expressed when laying the foundation stone of the former: "May I live to see it resist the united efforts of France and Spain." Several mementoes of the siege remain. Eliott (who was created Lord Heathfield for his services) is commemorated by a bust in a prominent position to the south of the Alameda, and by "Eliott's Battery," built in 1845. Green, his Chief Engineer, who was promoted to Major-General during the siege and was subsequently created a baronet for his services, and was Chief Engineer of Great Britain from 1786 to 1802 has his name preserved by "Green's Lodge"—the name given by Eliott to this work which was proposed by Green before the siege, commenced on August 20th, 1779, and completed as a 5-gun battery on September 10th, being then the highest battery on the Rock.‡ Boyd, the second in command and Lieutenant-Governor, is commemorated as already narrated in King's Bastion and by a tablet in King's Chapel. "Witham's Garden" preserves the name of a Captain in the Royal Artillery who seems to have been a very energetic officer, and who evidently made things lively when he was on duty in the batteries. The following are two of the entries in Spilsbury's Diary which no doubt refer to him: "July 15th, 1781. The Jews' burying ground dug up in the night by Capt. W.——, Artillery, and made a garden of." "September 10th. The inhabitants, etc., all leave the Town when they know Capt. W. is on the batteries; at other times the Dons fire only their usual three shells." As a reward for his services during the siege he was granted an honourable augmentation of his arms, and was given a pension of £300 a year derived from the property now occupied by the Lunatic Asylum, Witham's Garden, and Villa Plata. The lease of this property was continued to his widow, and then to his unmarried sisters, after whose deaths it reverted to the Crown. The keys of one of the gates or bastions of the fortress were given to him and are still in the possession of the family, but it is not known to what gate they belonged nor

* Porter, Vol. I., p. 84.
† A spirited account is given in the *Annual Register* for 1782.
‡ Porter, Vol. I., p. 85.

Digitized by Google

whether they were granted to him on account of any specific act of valour in connection with that gate. He died as a Colonel in Jamaica in 1799.* "Corsican Post" commemorates the detachment of Corsicans who arrived in July, 1782, numbering about 70 officers and men and who were posted at first at Windmill Hill to guard the prisoners. In December, 1782, they furnished two guards near the Rock-gun whose duty was to pick off the Spaniards below, and, in January, they also furnished posts in Queen's Lines, and above Middle Hill. There is frequent mention of them in Spilsbury's Diary.

At Government House there are interesting relics:—the gigantic wooden figure of Eliott grasping the Key of the Fortress, which was cut out of the bowsprit of the Spanish man-of-war *San Juan*, taken at Trafalgar; and one of the grates used for heating the red-hot shot (or "roast potatoes" as the men called them); while the panels of the dining-room doors are formed out of the dining tables mentioned by Drinkwater as having been made from the wreckage of ships destroyed during the great attack.

The residence of the Admiral Superintendent of the dockyard is connected with the memory of Sir William Green. In 1775, Green having, at his own expense and with the approval of the Commander-in-Chief, enclosed and cleared the ground a grant was made to him of about half of the present grounds of "The Mount"; and in 1783 the remainder of the grounds were granted to him. All the property, including a house which he had built upon it and which he occupied during the siege was sold by him to the Admiralty in 1797. It was then known as "Mount Pleasant" (a name now applied to a neighbouring house occupied by the Eastern Telegraph Company) and is mentioned under that name in the diary kept by Lady Green during the siege and quoted in Porter's *History of the R.E.* The buildings erected by Green are not those now in existence. The present residence was built between 1797 and 1811 and was considerably altered in 1846.† Green had come to Gibraltar as Major in 1760 to command the Engineers and to fortify the place,‡ having previously seen much service, including the capture of Quebec in 1759 when he was wounded. He retired in 1802 and died in 1811.

During the great siege the well-known galleries were commenced; and the memory of the man who first suggested the idea of their construction is preserved by Ince's Farm. Sergeant-Major Ince belonged to the "Military Artificers." The officer under whom he worked was Lieut. Evelegh of the Engineers.§ Ince began his gallery

* Information furnished by Major Leslie, R.A., and the Gibraltar Crown Lands Office.

† The above information is compiled from records in the possession of the Admiralty.

‡ For his report on the fortifications see No. 17.

§ *Travellers' Handbook.* The name is wrongly given both in this book and in Montero, p. 432, as Evoleth.

Digitized by Google

(now known as the Windsor Gallery) on May 25th, 1782; and by 14th January, 1783, four guns were mounted in it. The preliminaries of peace were signed on January 20th but Ince's work went steadily forward. By May 11th a little over 200 yards had been constructed with 10 embrasures, and by June 3rd "The Notch" or projecting rock in which is St. George's Hall had been nearly reached, and an approach to it was being constructed. A gallery to connect King's and Queen's Lines was also formed in 1782.* Ince was rewarded after the siege by the gift of the farm which still bears his name though it has reverted to the possession of the War Department and is no longer a farm. He also received a commission as Ensign in the Royal Garrison Regiment dated February 2nd, 1796, in which regiment he was promoted to Lieutenant on March 24th, 1801. The regiment was disbanded in 1802, up to which time Ince served at Gibraltar as an Assistant Engineer. He died at Penzance in June, 1809, aged 72. Evelegh lived to be a Lieutenant-General and died in 1815. Montero states (p. 432) that he was rewarded by the grant of "a spacious site in the central part of the Mountain, to-day covered with buildings," but it is not now known what that site is.†

The complete failure of the tremendous attack of September disheartened the besiegers who however continued to throw about 1,000 shot and shell daily into the place and even opened some new trenches. In October the British fleet under Lord Howe entered the Mediterranean and sent in reinforcements and supplies; and the enemy's camp began to break up but even in December an attempt was made to mine the Rock at a point near the Devil's Tower where a Spanish guard of 300 men was posted. Hostilities ceased on the 5th of February, 1783, when the last shot was fired.

The prolonged and severe bombardments had of course reduced most of the town to ruins. So early as May 9th, 1781, Drinkwater records that "Scarce a house north of the Grand Parade"—(which the plan shows was at what is now called "Commercial Square")—"was tenanted . . . The Governor and Lieutenant-Governor, however, maintained their quarters . . . Both had bombproofs, and the former afterwards had a large tent pitched on a rising situation south of the Red Sands where with his suite he generally remained during the day, returning at night to town; but the Lieutenant-Governor constantly resided in town, having accommodation in the King's Bastion." Perhaps the Governor's bombproofs were those which still exist against the walls of the former western portion of the Chapel and on the east side of the Patio or Court. As to the final state of the place, Drinkwater says that two powder magazines in front of the South Barracks "were the chief, I might

* Drinkwater and Spilsbury.

† *The Travellers' Handbook* states that both these grants of land were long leases.

Digitized by Google

say almost the only, buildings remaining on the Rock after the late siege; and their preservation was owing to their being kept in constant repair by workmen purposely appointed for that duty."

The destruction of the town was however not quite so absolute as this might lead one to suppose, for he records that when the Spanish commander, the Duc de Crillon, visited the garrison on 31st March the officers were introduced to him at the Convent, where also he dined* and where too a State dinner was held on St. George's Day (April 23rd) to conclude the ceremonies at which General Eliott was invested with the Order of the Bath and the thanks of the King and Parliament were officially communicated by him to the garrison. The peerage was not given to him until his return to England in 1787. Spilsbury sadly records "The Field Officers, etc., and Staff dined at the Convent, and the soldiers, etc., have a bottle of wine and a pound of fresh beef each, gratis, so that the Captains and Subalterns are the only ones not taken notice of in this day's entertainment." He adds, with evident satisfaction "that the lights were blown out, that the rain came in, that the mob were disorderly, that never was a worse salute performed by the artillery . . . a worse feu-de-joye fired by troops, worse weather, worse musick, worse fireworks, or worse entertainment."

The rebuilding of the town was soon taken in hand, but unfortunately, as observed by Drinkwater, the old plan and old foundations were adhered to, so that the grand opportunity for laying out wider and more convenient streets was lost. One of the few new buildings was the quarter for the Chief Engineer which was built on ground shown by the plans of 1736 and 1753 to have been partly vacant and partly occupied by the outbuildings of a house which had been his quarter since 1727, when it was "given to him greatly out of repair," and which stood in the southern part of the present front garden.† A barrack for 94 men occupied the present stable block or its site. The house bears the inscription near the front door "Chief Engineer's Quarter, 1786"; and the pay lists show this quarter as having been "re-established" during 1786 and 1787, while some additional work was done in 1788.

Another quarter which was constructed about this time was that for the Lieutenant-Governor which was formed at some date prior to 1789 out of three officers' quarters.‡ A part of it was afterwards cut off in order to complete the site for the Church of the Holy Trinity (now the English Cathedral) and the remainder forms the present quarter of the Assistant Adjutant-General.

* Spilsbury.

† W.D. Bill Book No. 228 at the Record Office states that the quarter was "entirely destroyed at the commencement of the enemy's fire from their batteries upon the Isthmus."

‡ Nos. 10, 11, 12 in a MS. notebook in R.E. Office containing a list of quarters.

Digitized by Google

The bastions and curtains of the town had been so much damaged that a great part of them had to be taken down and rebuilt,* the new line being thrown further out into the sea. In several places however the old wall still remains, as at Prince Albert's Front where the old shot-marked wall and the "Main-Guard Sallyport," constructed in 1787,† may still be seen behind the new wall.

* Drinkwater, p. 28.
† Garrison Orders July 30th, 1787.

(*To be continued*).

ENGINEER HOUSE, GIBRALTAR,
October 5th, 1910.

The Editor, R.E. JOURNAL.

SIR,

There is an error in my paper on Gibraltar on p. 246 of the last *Journal*. At the end of the "King's Chapel" section the words "which were in the north corridor of the patio but had in 1844 been covered over by the plaster" are misplaced. They do not refer to the doorways but to a Franciscan coat of arms which formerly existed in the north corridor.

Also in all the references to Montero in the October instalment of my paper "Don F. M." should be deleted. The error has arisen from a correction which I sent you for a later portion of the MS., where reference is made to Don F. M. Montero, the son of the historian.

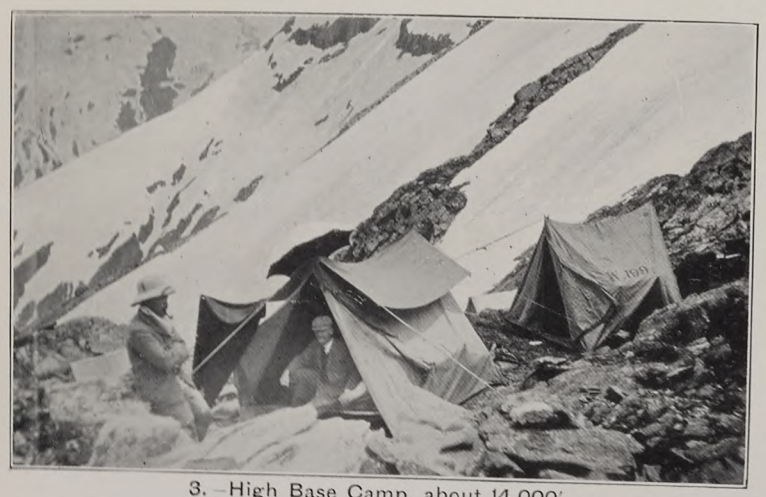
Yours faithfully,
E. R. KENYON,
Colonel.

Digitized by Google

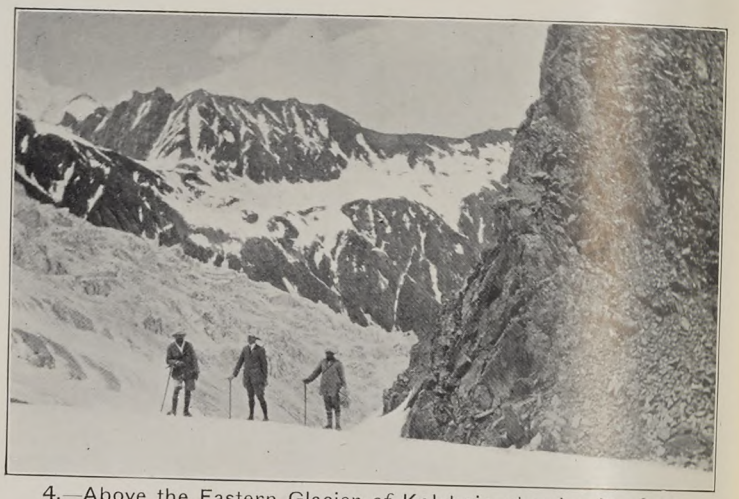
Digitized by Google

1.—The Frozen Lake, Har Nag.

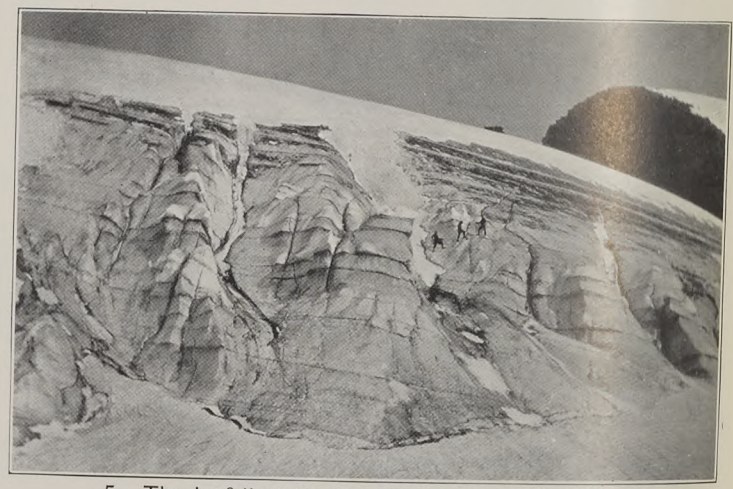
2.—The Survey Peak of Rajdain—from the Low Base Camp at Har Nag.



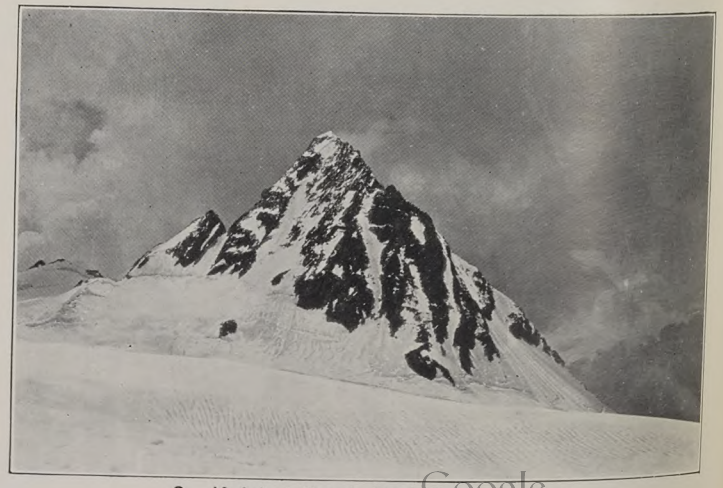
3.—High Base Camp, about 14,000'.



4.—Above the Eastern Glacier of Kolahoi; showing its séracs.



5.—The Icefall at the East End of the Snow Plateau.



6.—Kolahoi North Peak from the East.

Digitized by Google

A CLIMB ON KOLAHOI.

By Lieut. Kenneth Mason, R.E.

Kolahoi, the "Matterhorn of Kashmir," rises to a height of 17,839′, and is one of the highest peaks in Kashmir proper. It rises out of a snow plateau, at a height of about 14,800′ or 15,000′, and exposes nearly 3,000′ of precipitous rock, gashed here and there by snow couloirs.

This peak was fixed by the Survey of India and named "Kolahoi," from the district to the north-west; but the villagers now call it "Harbagwan."

It is the northern of four peaks which rise out of the plateau, and the highest by some 800′. Dr. Neve, the well-known missionary and climber, distinguishes them by the names,—"North," "South," "Buttress," and "Roof" Peaks. They are all "peaks" in the truest sense of the word, and are detached from one another.

The North Peak ends in a knife-like "arête," studded with "gendarmes," and capped with a somewhat nasty-looking snow cornice; a 3,000′ or 4,000′ precipice faces the north side, and there is a slope of some 70 or 80 degrees on the south.

The snow plateau is probably some 200′ thick, and of consolidated ice for the greater part of its thickness. This plateau probably feeds all the glaciers of the district.

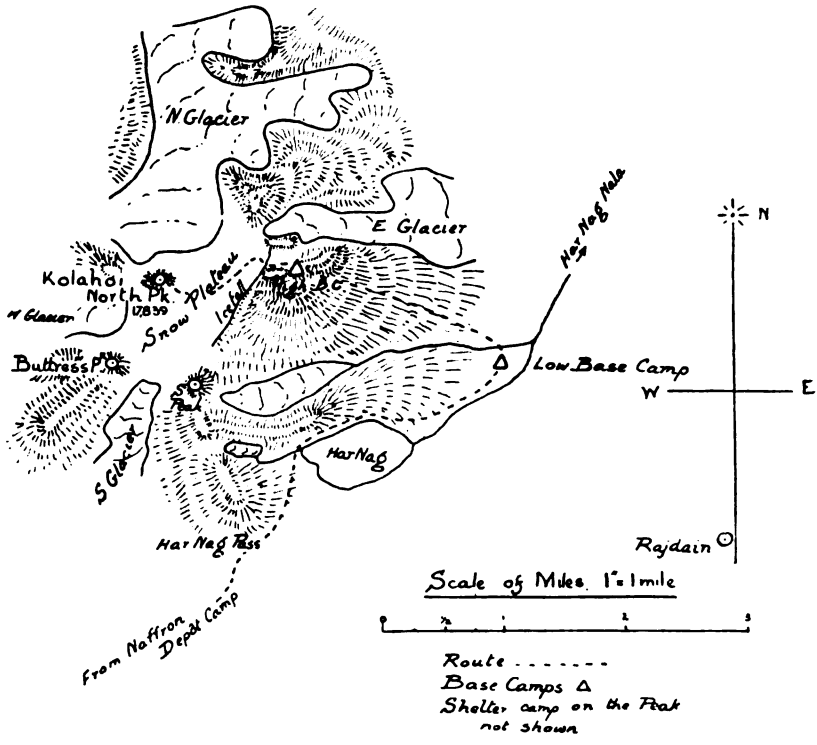
On the invitation of Dr. Ernest Neve, Professor S. G. Dunn of the Indian Educational Service and a member of the Climbers' Club, and I moved up the Lidar Valley, with the intention of meeting him at Aru on the 24th June, 1910. A "parwana" from the Governor was sent on to the Tehsildar of Pahlgam ordering him to supply 15 coolies, from whom we intended to choose. Mention of Dr. Neve's name in connection with the trip, procured excellent men, though one member of the party found "Keating's" absolutely necessary to procure him even a doze!

The weather was bad, and threatened to be worse, so, on our arrival at Aru, we found a note from Dr. Neve saying that he was pushing on, and that he would await us at Naffron. On the following day we reached Naffron, and met him.

Leaving our baggage ponies and a depôt camp here, we crossed the Har Nag Pass, about 12,500′, on the 26th, (see sketch map).

Digitized by Google

SKETCH MAP OF KOLAHOI.—JUNE, 1910.



From the top of the pass, (*Photo* 1), we looked down on Har Nag, a high lake covered with broken ice and snow. On our right and left, glaciers fed the Nag, and snow streaked the lower slopes of the mountain sides. We encamped north-east of the Nag, amidst wild flowers—amongst which Dr. Neve discovered a "yellow poppy"—and the warning notes of the terrified marmots, which scuttled into their holes on our approach.

In the afternoon we sent coolies out to collect wood (juniper bush) for fuel for the high camps. A musk deer came to within 30 yards of the camp to inspect the intruders, and decided we were dangerous. Musk deer are protected by law in Kashmir, so his alarm was unwarranted. Dunn also saw a couple of pine marten but did not get a shot.

On the 27th, the party moved up the eastern spur of the mountain mass, leaving a low base camp at Har Nag. From here we moved light, and observations were taken with a pocket clinometer and prismatic compass.

We ascended some 2,000′ on the spur, mainly on grass and snow, going nearly due west, and about tiffin time reached a saddle near by which we camped (*Photo* 3), at about 14,000. Our view from here gave us some idea of the strenuousness of the work to come. We

Digitized by Google

could not yet see the North Peak, but just north of us the Eastern Glacier of Kolahoi, divided at its upper end by an isolated ridge, tumbled down in numberless séracs and icefalls, (*Photo* 4). Due west of us we had a glimpse of the formidable-looking icefall which we still had to encounter before reaching the great plateau. To our south-east, the Survey Peak of Rajdain (*Photo* 2) stood up very finely, and Panjtarni and the Kohenar Peaks near the Sheshanag showed up occasionally through the ever-increasing clouds. About this time we all developed headaches.

Our camp consisted of two Whymper tents, one Mummery, and two small ones. A Whymper tent weighs about 16 lbs., and a Mummery only about 5 lbs.; the latter is pitched with ice axes and can be carried in the pocket.

In the evening a couple of ibex crossed the ridge to our south, and, after a magnificent sunset which seemed to promise well for the morrow, we turned in.

During the night a thunderstorm raged over Rajdain and Sheshanag, and some rain fell. We arose early in the morning, and leaving a high base camp we moved off with a very light camp,—one Mummery and one Whymper—at 6.15 a.m. The party included about a dozen coolies and two shikaries, Abdulla Bhat and Ahmdu; both these men were trained by Dr. Neve, and the former accompanied the Duc d'Abruzzi on his K2 climb last year when he reached a height of 24,500′, while the latter was with Drs. Neve and Longstaff on their expedition to the Saichar Ghainri Glacier. Our route lay round the snow bordering the south branch of the Eastern Glacier, and after traversing this, at 7 a.m. we reached the foot of the icefall at the east end of the Great Snow Plateau (*Photo* 5).

The snow was in excellent condition, and with boots well nailed it was easy to kick steps the whole way, and easy for the coolies, who wore grass shoes, to follow. Another musk deer crossed our tracks behind us, and bounded over the snow towards our camp; one could not help envying him his agility.

The icefall (*Photo* 5), about 150′ high, was climbed, Dr. Neve cutting steps and leading on the rope; the top was reached about 7.30 a.m., when Dr. Neve instructed the coolies how to anchor an ice axe at the top and let themselves down on the rope.

From the top of the icefall we saw a curious phenomenon;—the sun was up and shining through light clouds. A very fine sleet was falling, and round the sun was a rainbow! The rainbow was not a small halo, but its diameter subtended an angle of about 45 degrees at our position. I do not know the explanation of this. Is it possible that the rainbow was caused by a reflected sun on the snow behind us?

After traversing the snow slope, we came in full view of Kolahoi North Peak. Dr. Neve pointed out his high shelter camping ground

Digitized by Google

of a previous expedition, and some coolies collected the wood that was not used on that occasion. Here we halted to take photographs (*Photo* 6), and then traversed the plateau. The foot of the peak was about a mile away, as the crow flies, from the point from which we took the photographs, but owing to crevasses the party had to make occasional détours on the rope. As a matter of fact, the crevasses, even where covered with snow, were always easily distinguishable, as they were always indicated by a concavity in the surface of the snow which was much furrowed by the action of the wind.

On our left the mass of the South Peak loomed up out of the snow to a height of 17,000′, and about halfway up the north face was a large bergschrund. Lower down were some fine ice cliffs. Beyond it to our south-west, was the Buttress Peak. We reached the foot of the North Peak about 9 a.m. and climbed the lower slopes on to rock for breakfast. It was with some difficulty that I could eat any as I was having a taste of mountain-sickness. However, I managed to eat a piece of sheep, which was smoked, and a hard-boiled egg, after which I felt better. Mountain-sickness is like being in a small open boat, with a taste of liquorice in one's mouth. If we could not get the coolies up with the camp, we intended to come down and camp here.

After breakfast we traversed on snow to a couloir and began a steep ascent. As the snow became steeper, we crossed it on to rock, traversed the main couloir, and again reached rock.

We then had some 700′ of rock at an average slope of 50 or 60 degrees, some being steeper. The difficulty was to get the coolies up, and more than once they all but refused. However by dint of persuasion and encouragement, aided by a friendly ice axe, they came up. Dr. Neve selected a place for a shelter camp,—the best under the circumstances,—and the coolies built up a platform composed of ice and snow retained by a wall of rocks. There was no room for either of our two small tents on the level, and on this small platform we pitched the Whymper tent. It seemed a very precarious position but served its purpose.

With us we retained Abdulla, Ahmdu, and two specially selected coolies; the remainder we sent down with the spare rope and ice axes, and we then had tiffin. The Mummery was pitched just above us.

Snow fell during the afternoon and about 6 o'clock we dined,—the three of us in the Whymper tent, packed like sardines.

In the evening we had a beautiful glimpse of our position, and all the distant mountains, including the Nun Kun Peaks, showed up a perfect red in the setting sun. Again it almost seemed that the morrow must be a glorious day; but even if one could get no further, one felt that that panorama compensated for all the efforts of the day, and justified the attempt. This camp was about 16,000′.

Digitized by Google

We turned in about 7 o'clock, and tried hard to get some sleep. The two shikaries and the coolies passed the night in the Mummery. There was just room for the three of us in our tent abreast. None of us slept much; and about 2 a.m. I got up to tie back the tent flaps, as it had become too stuffy; I looked out, and could hardly see a yard in front of me. We were in thick cloud, and shortly afterwards snow began to fall.

At 4.30 a.m. when we had intended to make a start, the snow was still falling, and we had to clear the snow off the tent from within. The occupants of the tent above us did the same, with the result that their discarded snow fell on our tent.

About 7 a.m. matters began to improve, and Dr. Neve and I had breakfast. Dunn was unable to touch any food, owing to mountain-sickness, and reluctantly had to remain behind in the shelter camp, with a coolie. At 7.30, the remainder of the party started. The rocks were very wet and slippery, but the sun shone out for a short time, and helped to dry them. The angle of ascent averaged 70 degrees. For some distance the rope was not used, as it was Dr. Neve's intention to try and get up as soon as possible, and on rock of this description, the rope is liable to become entangled with projecting parts and cause unnecessary delay. The formation was "trap-rock" and as a rule afforded good hand and footholds, but great care was necessary to avoid displacing large masses of loose rock, and every hold had to be tested.

After some time I had an attack of mountain-sickness and had to stop. Dr. Neve, Abdulla, and Ahmdu went on with the rope, while I descended to the camp. Eventually, Dr. Neve, after encountering continual bad weather, reached a point some 300 to 400′ from the top,—the same point he reached on a previous attempt in 1902. The weather had become vile, and on the arête leading to the summit, he found it impossible to proceed.

In the meanwhile, the coolies, who had been sent down the day before, returned to the shelter camp, and, leaving provisions for Dr. Neve according to his wishes, we packed up the camp and moved down the peak, across the snow plateau and down the icefall, to our high base camp. Dr. Neve, after some time, joined us here, as arranged. His breeches were torn right across the leg, and Abdulla's had suffered to a less extent. We then returned to our low base camp, as we all wanted sleep very badly, and the weather was still disgracing itself. In addition, it was a good thing to be able to get down to altitudes where one could change into different clothes for the night,—and have a wash. As my bearer had omitted to pack certain bifurcated garments of mine, it was pleasant to reach a spot where their absence was less felt.

The next day the party broke up, Dr. Neve continuing down the Har Nag Nala, while the remainder of the party recrossed the

Digitized by Google

Har Nag Pass, *en route* for Srinagar, "the City of the Sun," (as opposed to "Clouds").

This is Dr. Ernest Neve's sixth attempt on Kolahoi, and it still remains unconquered! He decided that the only hope of succeeding, at any rate from the east, lay in crossing the plateau, and putting a shelter camp as high as possible on the peak, so that the mind and body should be as free as possible from fatigue, for the somewhat sensational arête finish. Even on a snow slope at this altitude one has to stop every few steps, and rock climbing is much more fatiguing. The decreased pressure affects the head and extra corpuscles have to be formed in the blood to counteract the rarity of the atmosphere.

What with the heat of the sun, even when shining through clouds, the rarefaction of the air, the extra exertion entailed, added to the absence of comfortable hotels as bases, and the conveniences of civilization close at hand, climbing in the Himalayas and climbing in Switzerland are as far apart as their respective fields of operation. In addition to these difficulties of climate and situation, Kolahoi would be reckoned a difficult peak from a technical climbing point of view, even in Switzerland.

One point stands out in favour of climbing in these parts; at an absurdedly low scale of pay, it is sometimes possible to get two of the best shikaries as guides, well trained in climbing craft, accustomed to living their lives in the open, and willing to go anywhere a sahib takes them. It is possible, too, by encouragement and fair treatment, to take coolies lightly laden, and it almost passes comprehension how these villagers and Gujars, whose pay on a trip of this sort does not exceed six annas per diem, will go as well as they do.

Digitized by Google

MAJOR-GENERAL SIR WILLIAM REID, R.E., G.C.M.G., K.C.B., F.R.S.

(Continued).

By Col. Robt. H. Vetch, c.b., late R.E.

Lieut.-Colonel Sir William Reid embarked for Malta on the 3rd November, 1851, in the P. & O. steamer *Indus*. He was accompanied by Lady Reid, four daughters and his son-in-law, Capt. E. G. Hallewell, who was on his staff. Sir William had lost his daughter Lucy at Woolwich in October, 1850; and the daughters who sailed with him were Mrs. Hore, whose husband was at sea, Mrs. Hallewell, Charlotte and Grace.

On the 11th November, 1851, a week after he left England, Sir William Reid was promoted to be Brevet Colonel in the Army. He was then over 60 years of age and had served for nearly 43 years. During his term of office in the Government of Malta he received two further promotions in the Army, viz., to a Regimental Colonelcy in his own Corps on the 17th February, 1854, and to be Major-General on the 30th May, 1856.

Colonel Reid's position when he arrived at Malta was anything but a bed of roses. Like his immediate predecessor, the Rt. Hon. Richard More O'Ferrall, he was Civil Governor and Commander-in-Chief, that is the military command and administration was entirely distinct from the Government and under a general officer, although, of course, the General was subordinate to the Governor as Commander-in-Chief. In the Army the new Governor was junior to the General Officer Commanding the Troops, and also to the Colonels Commanding the Royal Artillery and the Royal Engineers, and there was some soreness and jealousy on their part on this account.

As regards the civil community Reid arrived at a critical time in the political history of the island. In succeeding Mr. Richard More O'Ferrall in the Government, he succeeded one who, in spite of his being a Roman Catholic and therefore in religious touch with the inhabitants, who are of that persuasion, did not succeed in ingratiating himself with the Maltese, as had been hoped and expected when he was appointed. Unfortunately the impression existed among them that the previous Governor, Sir Patrick Stuart, had been recalled on account of a riotous demonstration during the carnival of 1845. This

Digitized by Google

impression, however erroneous, infused into the disaffected an exaggerated self-importance. They strove for political power, and agitated for reform. A patriotic association was formed and great excitement prevailed in the islands. The local press fanned the flame by articles of frenzied antagonism to the Government. The Colonial Office met the agitation by concession, and the year before Reid's arrival the constitution of the Council of Government had been amended to admit members who should represent the people on an elective franchise. The number of elected members was not, of course, sufficient to enable them to have a majority of votes at the Council Board. This made a new grievance and, when Reid arrived, there was still considerable agitation on the subject.

The period that followed formed a striking contrast to the months that preceded his coming. The new Governor arrived on a quiet autumn day. He was not fêted like his predecessor. There were no rejoicings, no processions. But from that day gradually the heat and violence of party, which had pervaded all classes of the Maltese community, began to cool down. The Patriotic Association showed unmistakable signs of collapse. The patriots soon went back to their schools or their trades, while the press grew daily more and more moderate. To what was this stilling of the political tempest due? It was that Reid brought to his new Government the same tact and firmness that he had displayed in other spheres, and the same unostentatious activity which had distinguished him in Bermuda and the West Indies.

By always consulting the General and the Admiral, and never interfering in military administration he succeeded in establishing proper relations with the Services, while, as the late Sir Adrian Dingli, who was his Advocate-General, has recorded: "Sir William, as President of the Council, with his great sagacity, prudence, and firmness conducted the legislative business of the Council in such a manner as to give general satisfaction. His attention was chiefly directed to the improvement of the educational establishment, erecting new primary schools in various localities in Malta and in Gozo, and improving those which he found. By his effective moral support to his legal adviser the codification of the civil laws of Malta was commenced and carried out to a great extent. He caused an ordinance to be enacted for the creation of a Maltese Militia, he himself personally superintending the formation of a small Volunteer Artillery Corps."

It seems strange that Reid, brought up in a Presbyterian manse, nevertheless always managed to maintain those amicable relations with the Roman Catholic bishop, priests, and people of Malta, which his Roman Catholic predecessor had been unable to do. They saw that he had the good of the people at heart for he carried out the same homely designs for their benefit which had been so successful in

Digitized by Google

his other governments. He took an immense interest in education and started a secondary school for girls of the middle classes, somewhat in advance of what was then usual in the education of girls, for the study of Euclid was included in the curriculum. He also founded a botanical and agricultural school; he imported agricultural implements, and new kinds of seeds suitable to the climate and soil; he introduced a new species of cotton plant; he established barometers in public places to warn the Maltese fishermen of impending gales. As regards material improvements it is enough to mention the two principal gates of Valetta, viz., Porta Reale and Lascaris Gate, and St. Anne's Gate in Floriana, works which have immensely facilitated the traffic between the town and the country; the improved water supply; and the dredging of the harbours. He also brought the library of the old Knights of Malta into a state of efficiency and usefulness more in accord with its name of "Public Library," and by the introduction of modern literature fitted it to serve the large community for which it was required. As Lefroy says: "Whatever attainable practical object commended itself to his judgment, that he undertook with the same quiet determination, which, in 1851, enabled him to falsify adverse predictions and attain the object to which he was pledged, in the punctual opening of the Great Exhibition."

How rapidly, after that same Exhibition, which was welcomed so loudly as the herald of universal peace, had become a thing of the past, did the storm clouds of war gather, and the political sky become overcast and threatening! If Reid showed his ability as a Governor in the peaceful achievements I have mentioned, he rendered more eminent services to his country during the war with Russia and while that conflict was approaching.

In February, 1854, Sir William wrote to a friend in the United States: "We are preparing for the Russian *storm*, the first portion of 10,000 men from England having just now entered the harbour. I must in charity believe the Czar to be mad, thus to compel mankind to begin anew to destroy each other."

In a time of extraordinary difficulty when Malta was becoming an *entrepôt* of the first importance to the British Army in the east, and all its resources were strained to the utmost, it was fortunate, indeed, that there were two men in authority at Malta capable of appreciating the position and not afraid to assume responsibility. The Governor and the Admiral, Sir Houston Stewart, worked shoulder to shoulder with untiring zeal, and to them it was due that so much was done, and promptly done, to lend the help so urgently needed, which could not be obtained without the greatest difficulty from home.

We have a glimpse of Sir William Reid when the war began, seen from a French standpoint, in the "Memoirs of Marshal Canrobert," by Germain Baptiste. General Canrobert accompanied by his staff

Digitized by Google

and the brigadiers under his command, touched at Malta in March, 1854, on his way to the east to take command of the 1st Division of the French Army in the war with Russia.

"At the landing place we found several officers of the Governor's Staff, and we drove in His Excellency's carriage to the old palace of the Grand Masters, where Sir William Reid received us in the kindest manner. As an officer of Engineers he had served in the wars of the Empire and was several times wounded. In 1854 he still carried a ball in the right leg, received in the Peninsula; he limped slightly, and a wound received at Vittoria (? St. Sebastian) had caused a stiffness in the neck.

"The cordiality with which he received us proved that he bore no grudge against our countrymen.

"Like all the high British officials I have met he was essentially 'the gentleman'; tall, with a large high forehead, bright eyes, and hair of snowy whiteness, whilst his wounds added to the attraction of his well-bred manners.

"Sir William was an Engineer officer of repute, and devoted his leisure to mathematics and natural science, and became subsequently President of the London Academy of Science (*sic*); he was then engaged in the rearrangement of the Old Library of the Knights, of which fresh catalogues were in course of preparation.

"He spoke French perfectly, having been quartered in Paris from 1815 to 1818.

"His Excellency first introduced General Sir William Bentinck, commanding the Brigade of Guards, and then we went into luncheon, after which the Governor took us to the Race Course to see the Guards on parade.

"After the march past, we heartily congratulated His Excellency and the General on the fine appearance of the troops (big men averaging about 6' in height), and their steadiness under arms.

"'General,' replied Sir William Bentinck, 'I should now like to show you a square of British infantry. If you will come to this rise, gentlemen,' pointing to one a few paces from us, 'the Grenadiers shall form round you.' The movement was carried out with wonderful precision, and we found ourselves enclosed in a redoubt of giants in red, four deep, the two front ranks kneeling, the standing ranks at the ready.

"Bosquet, Martinprey, Trigier, Brady and myself exchanged glances to note the impression made on us by these living walls, and I whispered to my neighbours, 'Now do you understand Waterloo?'

"The French Generals saw in the person of Sir William Reid the ideal type of the British General, realized that cool determination was the leading characteristic of the private soldier; moreover they gathered that the British Army, true to its old traditions, had not altered in the last 50 years.

"Our Generals, therefore, formed the opinion that they would find themselves on excellent terms with our allies, and that, even should they not always see things from the same point of view, their pleasant relations

Digitized by Google

would not only prevent any coolness in the alliance, but would always ensure co-operation in working out and executing any plan which might finally be adopted.

"Sir William kept us to dinner; everything was well done, and we were charmed by his conversation.

"Retiring from the Active List on account of wounds, he had served as Governor in several colonies. In 1851, at the time of the Great Exhibition, he had been President of one of the principal committees. Well informed, he was considered one of the leading officers of the Engineers and had been President of their Academy.

"In short he was an amiable, simple, and most interesting personality, and we left him with the happiest impressions of the first of our Allies we had come across."

With troops and stores of all kinds daily arriving at Malta and, after a brief stay, departing for the seat of war the Governor and the Admiral had their hands indeed full; and when tidings reached Malta —there was no telegraph—of the glorious victory, after desperate fighting, of the Battle of Inkerman, and the British loss of 2,000 men, nearly half the number engaged, the Governor rose to the occasion. Without waiting to consult the Home Government he took upon himself the responsibility of at once despatching to the Crimea a similar number of troops from the then small garrison of Malta, though it reduced the garrison to such an extent that it became necessary to leave much of the military duty to the police. For this important service he received the thanks of Government and his name was honourably mentioned in Parliament.

The following letters from Sir William Reid at Malta to Sir John Burgoyne in the Crimea have been preserved. They give a good idea of the kind of work which so much occupied both the Governor and the Admiral, and on the 15th November, 1854, Sir John Burgoyne wrote from the camp before Sebastopol to Colonel Matson, Assistant Adjutant-General for Royal Engineers on the Headquarters Staff in London :—"Reid, from Malta, is taking the course you have been occasionally adopting with so much advantage to us, of sending up matters that he judges will be of service, before receiving any absolute demand, and has thus frequently forestalled the application. He has thus just sent off two 13″ mortars with ammunition. . . ."

From Colonel Sir William Reid to General Sir John Burgoyne.

"MALTA, *22nd November*, 1854.

"MY DEAR SIR JOHN,

"Before this reaches you, you will have received by the *Golden Fleece*, the 24-pounders and 10″ mortars which you wrote about, as well as 18-pounder shot; and ten or eleven 13″ mortars and their shells went also. I wrote by the French steamer to the Duke of Newcastle a private

Digitized by Google

letter, advising that some more 18-pounders on *travelling* carriages should be sent to you from England without delay.

"I beg of you to continue to let me know by private letters what you most want, for such letters relieve us from doubts as to what may be useful. I believe troops are what you want most, and we have sent all our Malta Garrison, excepting one British battalion and the Malta Fencibles. I have written to the Duke of Newcastle about steam transport, for we must have transport in order to keep you supplied. Fuel you can get best within the compass of the Black Sea.

"I hope you will begin hutting in the Tartar mode, by cutting into the sides of hills. In that way the soldiers would get more warmth, as the deeper they sink the nearer they get to the mean temperature of the climate.

"We are getting platforms made, and I think have now 30 or 40 ready to send you. We are pressing the Malta clover for forage for you. General Torrens is with me, doing well and going to England. Colonel Gambia, R.A., in bed with the contusion by a cannon-ball, and goes home. Your son[o] is here. I have sent him your letter, and he will take this. I may perhaps go on board the *Swallow*.

"Yours, etc.,
"WILLIAM REID."

MALTA, *4th December*, 1854.

"MY DEAR SIR JOHN,

"I received to-night your letter of the 19th November; and as you only mention one as received from me, several others could not have reached you. They related to guns, mortars and ammunition sent to you. I feel it useless to wait until Lord Raglan asks: it is for us to send all and everything which we think may help you in your difficulties. I shall see if I can send you some warm clothing.

"Along with Admiral Stewart I am contriving trousers, and trying the Malta-Nankin blanketing for this purpose. At the Dockyard he is making stoves, and camp cooking furnaces to burn common coal. He has bought up all the planks and boards in Malta for hutting you, and sending tools and nails. To-morrow I am going to get him to make you some *chevaux-de-frise*. I have recommended the Duke of Newcastle to send you a large supply, to help you to render a few points in Lord Raglan's position strong points of support. A single line may be got through; but two or three deep, entangled together, and put in places covered from cannon, they form an obstacle very difficult to be overcome.

"Forage we know you want much, and I am always urging as much as possible to be sent. If you had more forage we should send Lord Raglan more mules and carts.

"I perceive that the sick and wounded officers carry away a number of effective soldiers from Lord Raglan. You had better mention this

[o] Capt. Hugh Burgoyne, R.N., V.C., who went down in H.M.S. *Captain*, turret ship, in September, 1870.

Digitized by Google

fact to his lordship, although I do not know that it can be helped. It is certainly right to give sick and wounded officers all the care that can be bestowed on them; but still this is a great evil, as it abstracts from the army many of the very best soldiers. I do not remember what was the Duke of Wellington's rule on this point.

"I hope you may be able to close your investment on your right to the harbour when the reinforcements arrive; for I cannot see what chance of success you have until this can be done.

"I am astonished at the ships not putting to sea when the gale of the 14th was setting in. I believe the wind was southerly, which would have enabled them to gain an offing on the *port* tack.

"Yours sincerely,
"WILLIAM REID."

"MALTA, *9th December*, 1854.

"MY DEAR SIR JOHN,

"I have received your letter of the 26th and Lord Raglan's note of the 29th November.

"Will you thank Lord Raglan for his lordship's note to me? We indeed think incessantly of your position. I would have sent the 62nd earlier, and on Admiral Houston Stewart's first suggestion (for he first suggested its going), but I am cautious not to overact the Governor, but consult with the General and Admiral. Although this mode of acting is sometimes painfully slow, it is best upon the whole for the public service.

"I have written both officially and privately to Sir Robert Gardiner (the Governor of Gibraltar), begging him to send on gunpowder, projectiles, etc., by every possible opportunity to us in Malta, to fill up our void by supplying you.

"And I have written to the Duke of Newcastle, advising His Grace *to send you four or five miles of tram-road.*

"Yours very truly,
"WILLIAM REID."

During the war with Russia officers who had been wounded, or suffered from illness, and in convalescence required a change, frequently visited Malta to recoup, and were always sure of a welcome from the Governor. The late Major-General E. R. James, R.E., who was a distant connection of Sir William Reid, records the great kindness he received when after his imprisonment in Russia he obtained a short leave of absence to visit Malta, in order to get a new kit, as he had no clothes but the old worn ones he was wearing. The Governor not only invited him to stay at the Palace, but knowing him to be short of money, insisted on his accepting a considerable sum of money and would not hear of any repayment.*

* I had this from General James himself in a letter dated 29th May, 1909, a few months before his death.—R.H.V.

Digitized by Google

But, indeed, Sir William's generosity was wonderful. He was never able to put by anything in any one of the three Governments he had administered. He told a friend this, and said that if he had not possessed private means he might have lived the greater part of his life in a palace and have died in a garret in his old age; this was before the day of pensions to ex-Governors.

When the war was over and the troops left the Crimea to return home, Malta again became a halting place and depôt. Both the British and French Armies passed through and, in the month of November, 1856, over 10,000 men were encamped on the island. The harbours were full of men-of-war, and of transports, and the Governor had a very busy time arranging with the Admiral for the transport home of so large a body of troops and such a collection of stores. For his eminent services during the war with Russia Sir William was created a Knight Grand Cross of the Order of St. Michael and St. George.

In the following year Sir William began to feel the necessity for a change. Since he arrived at Malta in November, 1851, he had not been out of the island; and for the last three years he had been too fully occupied with most responsible work in time of war to think of such a thing as taking leave of absence. Now, however, that the aftermath of the war was over and politically everything quiet, he had come to the conclusion that he would resign the Government. This step was pressed upon him by the state of his wife's health and the need he himself felt for repose.

Lady Reid had been in bad health for some years. She had a severe illness at Cheltenham in the winter of 1848, shortly after her return from the West Indies. This illness was attributed to the change of climate after 10 years of the tropics. But since then she had experienced several relapses and had never completely recovered her former good health. In fact for some time at Malta she had not been well enough to take her place in society and her daughter, Mrs. Hore, had to represent her.

In May, 1857, Sir William Reid tendered his resignation, but the Queen would not accept it and he was pressed to remain on another year. Some correspondence ensued and he consented to withdraw his resignation, and in August he took two months' leave of absence to take Lady Reid to England.

Sir William and Lady Reid were accompanied to England by their two unmarried daughters, Charlotte and Grace, and, on the expiration of Sir William's leave of absence, leaving them all at St. Leonards, the Governor returned to Malta alone to await the arrival of his successor, Sir Gaspard le Marchant, in the following year.

Lady Reid's health did not improve and she died rather suddenly at 17, Marine Parade, St. Leonards, on the 19th of February, 1858. On the day before her death she dictated a letter to her husband

Digitized by Google

which just caught the weekly mail to Malta and no doubt prepared Sir William in some degree for the sequel. But when the next mail arrived the sad news reached Sir William in a very distressing way. The letters by the English mail were taken to him just before entering the Council Chamber and it so happened that the first letter he opened contained condolences on Lady Reid's death from her sister, Lady Bolland. It was certainly very characteristic of the man that under such circumstances he did not postpone the Council meeting. Sending for the chief messenger he told him what had happened, and directed him to wait at the door and inform each member, adding a request that they would not speak to the Governor. But the blow was a very heavy one and one from which he never recovered. He wrote to his daughter, Mrs. Gambier: "It is an event I was constantly looking for, yet I feel it a severe blow. Although wasted to a shadow and her strong mind weakened, I respect even that shadow."

The young lady who, so many years before had captivated Mrs. Grant of Laggan by her noble countenance and mental qualities, had proved a tower of strength to her husband during the course of their married life. She had won all hearts by her gracious manner and kindly sympathy both in Bermuda and in Barbados, and it is touching to read how well they remembered her and how sincerely they seem to have mourned her death. As a sample of the tributes paid to her memory by the Colonial press the following extract is taken from a Bermudian newspaper, published just after the news of her death had been received:—

"The announcement of the death of this estimable Christian lady will cause deep regret in these islands. From the station which she filled here she was universally known; and from what is about to be stated, it must be added, as universally appreciated.

"The qualities of her mind were such as could not fail to inspire respect. Gifted by nature with great quickness of apprehension and a strong understanding, she exhibited in her remarks considerable originality of thought, and often threw much light upon the various topics of conversational discussion.

"She was a strict enforcer of propriety in every respect; but at the same time her intellect was of too high an order to be entrammelled by mere unmeaning conventionalities. She judged persons by their worth and things by their utility. Liberal in her sentiments she regarded with favour every enlightened plan, and zealously seconded every earnest endeavour for the general good. Nor was she impatient of contradiction—candid herself she thought highly of candour in others.

"It was not, however, so much her mental endowments that endeared her to the inhabitants of these islands, as her kindness of heart. Her path was literally the track of charity and benevolence. The cottages of the poor were familiar with her presence. There her hand was seen

Digitized by Google

open for the relief of the feeble and helpless, and there her voice was heard reproving the able but indolent. The industrious always met with encouragement from her; it was her delight to speak approvingly to them, and in praise of them to others. The writer of this article was often the medium of her charitable bestowments—nor was he the only one, many can bear like testimony to her beneficence.

"In the care of her family she was most exemplary, and her attendance upon public worship in the parish church was unfailing; she took interest in the Sunday School and in all benevolent institutions.

"Such was Lady Reid. She has occupied a place in the kindliest recollections of Bermudians since her departure from the country. She will still long occupy it, now that she has been removed from earthly scenes. . . ."

Information in detail about the last period of Sir William Reid's life has not been easy to get. I am indebted to the kindness of Mrs. Basil Hall, youngest daughter of Sir William Reid, for some particulars I have given of the Malta period; she was then Miss Grace Reid. Some years ago the late Colonel H. L. Hallewell of the Royal Scots, a grandson of Sir William, and son of his staff officer, Capt. Hallewell, endeavoured to get together materials for a life of his grandfather which he proposed to write. These materials, scanty enough, he was never able to make use of, as he was seized with illness and died in June, 1908. Through the courtesy of his widow I have had access to these papers. But in regard to Malta I find only some doggerel verses by Admiral Sir Houston Stewart and two letters from the Rev. George Wisely, for so many years Presbyterian minister at Malta. Mr. Wisely is, no doubt, well known to a great number of officers of the Corps, as he was Officiating Chaplain to the Forces at Malta for over 40 years; moreover, he is connected with the Corps through his son, Capt. G. A. K. Wisely, who retired from it 20 years ago. The two letters from the Rev. George Wisely were written in answer to applications for any information that the venerable minister might be able to give about Sir William Reid during the years he was Governor of Malta.

From the Rev. George Wisely to Mrs. Ogilvy.

"MALTA, 11*th December*, 1906.

"MY DEAR MRS. OGILVY,

"I wished to write at once by return mail with reference to your enquiry about Sir William Reid; but I thought I should read up a little first of Seddall's *History of Malta*, and I found it so interesting that I read on till past post time.

"He has only about four or five pages on Sir William Reid, . . .

"Mr. Seddall speaks highly of Sir William Reid and rightly. I will only give you a sentence or two:—

"'1851.—The new Governor, Sir William Reid, had already distinguished himself both as Governor of Bermuda and as the discoverer of

Digitized by Google

the Circular Theory of Storms. In the scientific world he was widely known; in private life he had gained the esteem of all who had the privilege of knowing him; and as Governor of Bermuda he had earned the reputation of being "firm but impartial."'

"After giving a brief history of Sir W. Reid's administration, Mr. Seddall closes it with these words:

"'Failing health compelled Sir William Reid to resign his office in the spring of 1858; and he left Malta carrying with him the respect, amounting almost to affection, of everyone who had the pleasure of his acquaintance, or the honour of being officially connected with him.'

"I can certify from personal knowledge that this statement of Mr. Seddall's is the simple truth.

"Sir William Reid was a man greatly loved and respected. I came to Malta in May, 1854, and I have now been under twelve Governors of Malta; and I can safely say that I never knew a better Governor than my first Governor, Sir William Reid. He was a good man, as well as being a good Governor. He was not like some, whom I have known, who could not do a good deed without letting it be known. He was utterly removed from anything like self-advertising.

"As an illustration of this I may mention a little incident which you will not find in *Seddall's History*, or any other history. In Sir William Reid's administration Porta Reale was opened—a magnificent gate, the chief entrance into the city. The inscription to be put on it was laid before him for his approval; it contained the usual formula: 'Erected under the administration of His Excellency Sir William Reid (with all his titles), etc.' He simply drew his pen through the whole and said: 'You can put up that it was erected "Pro Bono Publico," if you like, but you are not to put in my name.'

"Sir William had great tact; the previous Governor, although a Roman Catholic in religion and a Liberal in politics, and, at first, hailed as if he were an angel from Heaven, before he left Malta was execrated by the priests as well as by the popular agitators, whereas, as Seddall truly says, Sir W. Reid by his amicable temper, his benevolent projects, and his conciliatory manner, did much during his residence in Malta to allay the discontent that had been manifested a few years before.

"Very soon after I arrived in the island, he sent for me and asked me to become a member of the managing committee of a cemetery which he was to form that should be open to all. There should be liberty for whatever religious service the parties wished. This put an end to a state of matters which had caused many scandals, and much bad feeling. And yet no Governor was ever more beloved by the Roman Catholic priesthood in Malta. Without sacrificing his own principles, he won their affection and esteem. When I commenced building our Presbyterian Church, he sent for me and gave me a donation of fifty sovereigns towards the building.

"No one ever did so much for the tillers of the ground. It was Sir William Reid who established the Agricultural Society, which continues to this day.

"I doubt not your friend is aware that Prince Albert held Sir William

Digitized by Google

Reid in high esteem. I cannot speak of this from personal knowledge, but I know from well-informed sources that this was the case, and knowing what I do of the two men, I can quite understand it.

"I should mention that Sir William Reid did his best to promote education. He had to work under great difficulties, but although there was not much apparent success, he began a work which has gone on increasing. He added much to the Public Library, and put it on a better footing than it was before; and while he encouraged education among the higher classes, he did what he could among the children of the poorest villages. He deserved the name which was given him of 'Our Good Governor,' and which I have never heard applied to any other as it was to him.

"I shall close with one little incident. When Sir William was on his death-bed, he asked that his gold pencil-case should be sent to Don Filippo, an old Italian teacher. To his dying day, Don Filippo could scarcely speak of Governor Reid with dry eyes.

"I conclude with a wish that your friend may produce a work worthy of the subject.

"Ever yours,

"GEORGE WISELY."

(*To be continued*).

Digitized by Google

MEMOIR.

MAJOR-GENERAL EDWARD RENOUARD JAMES, ROYAL ENGINEERS.

(*Continued*).

By Col. Robt. H. Vetch, c.b., late R.E.

Continuing their course along the undisputed frontier line to the Araxes River, the International Commission arrived at Hadji Bairam, at the confluence of the Arpa Tchai and the Araxes, which, at this point, becomes a wide deep stream only fordable here and there. James records that the temperature was 100° Fahr. at midnight at the camp, which was 3,456′ above sea level, and that the mosquitoes were very troublesome.

From Hadji Bairam the frontier line ascended the Araxes to Parnaout. Near this place it was arranged to go southward to the point where it reached the watershed of the Ararat range. While in this part James and some others made the ascent of Perli Dagh, a peak on the Ararat range 10,500′ above the sea. They had a magnificent view from the top, Mount Alagos (13,500′) to the north, and to the east, the crest of the mountain chain terminating in the snow-covered cone of Ararat (17,000′). Alagos was 57 miles away and Ararat 40.

At the first examination of the frontier line to the east it was considered enough to describe it as the watershed line and to leave the marking it out to be done later by the surveyors. The proceedings were therefore adjourned to give time to reassemble the Commission at the Sardar Boulak Pass in the col between Great and Little Ararat, which, in a military and commercial aspect, was the only pass of importance across this section of the frontier.

"On the 22nd July a ride of 33 miles took us," says James, "to our camp which we found ready pitched on the Sardar Boulak Pass. It was easy of ascent on both sides; at the top it was a wide level and green valley, very suitable for the camp, at an altitude of about 8,000′, lying exactly between Great and Little Ararat. These mountains seemed to tower above our heads; the former, with its everlasting cap of snow, rising to a height of 17,000′, and the latter, free of snow in the middle of summer, 12,875′."

Digitized by Google

Between the 18th June and the 22nd July the Commission had travelled 188 miles at altitudes varying from 3,456′ to 8,000′ above the sea.

Of the grand mountains of Ararat where the Commission was encamped James writes:—

"It is rarely that any mountain can be seen for nearly 100 miles round, standing up as an isolated cone, from the summit of which there is a sheer descent, visible to the observer, of 14,000′ to the plain below. Throughout the summer season, when the whole region, except the summit of the cone, is free of snow, and the valleys round it are green, some 4,000′ are everlastingly crowned with a white cap, shining in the sun's rays, which are reflected from it, and mark the mountain at the enormous distances from which the summit can be made out. Then the sky all through the hot weather is of such a pure brilliant blue, and the atmosphere so devoid of haze, that the effect of great distance is lost to the eye, and objects appear so close as to make the distance deceptive. On the mountain itself there is no vegetation, and nothing but bare rocks where the snow does not lie; but in deep valleys, which are hidden from the view in general, there are green pastures frequented by the Kurdish tribes in summer. This absence of verdure from the ordinary views of the mountain makes its desolate grandeur the more impressive, and when I say that for several continuous weeks the mountain top was a distinct object in our daily view, it may be easily understood that the impression left on our senses was deep, and has been lasting."

Both Gordon and James tried to reach the top of Great Ararat, but, after getting some way up the snow-covered cap, were obliged to relinquish the attempt. The ascent of Little Ararat was so easy that they were able to make it on horseback. At its peak the boundaries of Russia, Persia, and Turkey meet. This point is at the eastern extremity of the mountain chain, with the great River Araxes and the small confluent of this river surrounding the position on three sides. "The view from it," says James, "with the river winding below 10,000′ down, in less than 10 miles, is a magnificent one, and well repaid us for our ride."

Leaving Sardar Boulak on the 2nd August the party descended to Aralyk on the Araxes, and made its way to Etchmiadzin, and thence, passing round the base of Mount Alagos on its eastern side, towards Alexandrapol.

During a two days' halt at Etchmiadzin, the most interesting of places, they visited the cathedral and monastery, marking the site of the foundations of central government of Armenian Christianity, where they were welcomed by the Patriarch Nerses. As the track to Alexandrapol, some 65 miles away, running round the base of Mount Alagos, has a rise of about 4,000′ in the centre it was necessary to allow the heavily laden pack animals four or five days to make the journey. The English officers utilized the time in visiting

Digitized by Google

Erivan, the old capital of the Persian province, which had become the seat of the Russian Governor and had a strong garrison. They rejoined the caravan at Kazafar at the foot of Mount Alagos at 9 a.m. on 8th August, having ridden 50 miles during the previous evening and early morning. The Commissioner, with Lieut. Helsham-Jones and Capt. de Norman, had gone on to Tiflis and, as there was no immediate necessity for an early arrival at Alexandrapol, James, Gordon, Woodfull, and Stabb decided to stay at Kazafar for a couple of days. They found Jaffar Agha, the Kurdish chief whom they had already met in the Ararat range, encamped close to them. They again dined with him in his black tent, and exchanged a gun and some powder and shot for some Persian and Kurdish carpets. Next day they made the ascent of Mount Alagos 13,500′ high. James says: "Accompanied by some Russian officers and some Cossacks we started at 6 a.m. We followed a steep and rugged, but by no means difficult path, reaching the top with tolerable ease; but notwithstanding this the three Englishmen of the party, and one Cossack, who carried the scientific instruments and had to obey orders, were the only climbers who persevered to the end. We took an observation to determine the altitude with the boiling water thermometer, and the Cossack fired his musket as a signal to show the watchers in camp that we were at the top. We were rewarded for our exertions by a magnificent view of Mount Ararat, 60 miles from us, and of the Araxes, looking like a thread of silver, extending as far as the eye could see. On the precipitous cliffs round the mountain, veins of pure rock-sulphur jutted out in inaccessible places, but the local peasantry obtained blocks of the mineral in a curious way, by firing bullets at the cliffs, and collecting the sulphur which fell. Our descent of the mountain was most exciting, as Gordon had a very narrow escape from losing his life. Exhibiting his characteristic impatience at the slowness with which we were descending, he seated himself on a snow slope, there being a good deal of snow on the mountain still, and commenced sliding down before we could prevent him from performing such a very rash act. We held our breath in awe while he sped down to a point which seemed a thousand feet below, and when, at length, we saw him turn over helplessly and disappear beyond a hump of snow, we lost all hope of seeing him again alive. The climb down to the spot at which we saw him last was tedious; and I can never forget our anxiety, or the joy we experienced, when Gordon met us smiling, looking as if nothing unusual had happened. After turning the somersault we had witnessed, his further descent had been providentially arrested by his tumbling on to a smooth rising surface of soft snow, and, beyond being slightly bruised, he was little the worse for the adventure."

On arriving at Alexandrapol a stay was made for a few days and a protocol drawn up of the progress made in the work of the Com-

Digitized by Google

mission. The route of the Commission was now along the northern section of the frontier. Leaving Kurdistan and Armenia they experienced, in the course of a few days, an entire change of scenery, population, and to some extent also, of climate, for the summer is very short in the high altitudes in which they travelled and they began to feel the chills of autumn.

Ascending the Arpa Tchai nearly to its source their successive stages were: Bandevan (5,900′) 14 miles; Tchishtapa (6,175′) 8 miles; Bogdanovka (6,474′) 15½ miles. To reach the last-named place, which is the basin of the River Kur, a mountain ridge, at an altitude of 7,515′, had to be crossed, and then they suddenly entered the lovely forest region of Georgia, known under the general name of Adjara. Descending rapidly they reached Akhakhalakha (5,720′), having diverged from the frontier line to avoid difficult hill marches through dense forest. The Commissioners thought it unnecessary to see the frontier line for themselves, as after following the "thalweg"* of the Arpa Tchai from Alexandrapol to the river head, the frontier was to be along a well-defined watershed line; besides there were no political difficulties at this part similar to those connected with the local tribes, which had been experienced on the Ararat range. It was therefore deemed sufficient to record the position of the frontier line by protocol, and to leave the actual delimitation to a Sub-Commission to carry out in the following year.

Leaving Akhakhalakha on the 15th August they reached the point Khaweth (5,798′), in the Ardahan branch of the Upper Kur, where it was proposed to fix the frontier. James writes: "We stayed three days at the camp at Khaweth, the Commissioners riding out each day to examine the various ridges before they fixed on the line. There were beautiful views of mountain scenery from the hilltops, and many lovely dales were exposed to our sight, in which lay the most charming lakes, amid forests of virgin timber; and we all remarked that if this region were made accessible to the tourist, it might compete with the most celebrated resorts in the attractions it would offer."

From Khaweth they followed the proposed frontier to Kharsameti Tchai, and along a series of ridges, Gampet Tepi at 9,730′, and two others each of 8,626′. At Khona, a village at 4,860′, near which was the Akhaltzik branch of the Kur, the Commission remained nearly a week for the purpose of examining the ridges and deciding on the line of frontier. A day was spent in visiting Akhaltzik (3,295′), the most important town between Alexandrapol and the Black Sea, and the chief place in the Adjara district; "but," says James, "we did not

* A convenient term to denote the central line of the flow of water in a valley, or the reverse of the "watershed line."

Digitized by Google

care to waste time in a town in this lovely autumn season, when the alternative was the beautiful Adjara country; a newly-found Switzerland, with valleys like those of Bavaria; a Killarney, as it may have been a century ago; or the highlands of Scotland before the '45 and the military roads of General Roy. In none of the countries named are there such forests, such splendid virgin oaks, ashes, and beeches. Sometimes there were open glades, where the trees grew singly, as in an English park, sometimes the woods were dense, and the only track the wayfarer could follow was the level space between the patches of forest running along the watershed line; and this was a peculiarity, never observed by me elsewhere. I had not time for painting, but my artistic soul was continually moved at the beauties of the landscape.

"Game, as may be supposed, was in abundance, and we furnished our table with that we were able to shoot with small trouble. I have a sad memory in connection with our sport: my favourite Sapper servant, Crompton, having lost his life by an accident with the gun I had lent him. It was not known precisely how it happened as he was out alone. He was carried into camp on a stretcher made with boughs by his comrades. He was then unconscious. It was thought he had followed a wounded bird, with one barrel of the gun at full cock, and had tripped and fallen over it as it exploded. . . . He was taken into the military hospital at Akhaltzik, where we were obliged to leave him in charge of Sapper Semple, when we resumed our march. Judging from my experience of a Russian hospital at Sebastopol I was not surprised to hear a few days later that the surgeons had not the skill to save him. Sapper Crompton was a fine soldier, and an excellent man in every way; he had followed my fortunes for two years, and was as devoted to me as I was fond of him, so it may be believed I felt his loss most acutely."

Mounting to the ridge again, on leaving Khona, and camping still amid forest scenery at heights varying from 6,500′ to 8,000′ the Commission came within sight of the Black Sea on the 3rd September. On the following day they descended to Gourni (657′) and, on the 5th, reached Osurgeth (182′) in the province of Guriel, only 12 miles from the coast. "We stayed a fortnight," says James, "in a Russsian house at Osurgeth to complete the protocols, and to close the main operations of the Commission. It was decided that a Sub-Commission should be appointed to undertake the surveying and demarcation of the frontier line, and should assemble in the following spring. It was notified to Gordon and myself that we were recommended as the English representatives."

The work of the Commission came to an end in 1857 with the pleasant fortnight spent at Osurgeth. The English Section gave a grand entertainment to their colleagues and to the families of the Guridian gentry. After paying farewell visits to all their associates

Digitized by Google

the English party left Osurgeth on the 16th September and marched to the Black Sea port of St. Nikolas. From this place, where they encamped for the night, the distance to Batoum along the coast is 25 miles and it was resolved to cover the distance in one day. They crossed the river, which formed the frontier. It was wide and deep, but putting the loads into boats and swimming the horses across, they were once more on Turkish ground and reached Batoum without further adventure.

James estimated that between May and the end of September, 1857, he had ridden over 1,130 miles.

The caravan was discharged and the horses, surplus stores and equipment were sold off at very small prices. A small dirty trading steamer carried the party to Trebizond, where they took passage by the regular Turkish mail-boat and arrived at Constantinople on the last day of September. Here the English Section separated and returned to England by various routes. James embarked in charge of the detachment of Sappers in the Cunard steamer *Alps* and arrived at Liverpool on the 9th November. Having been on foreign service for nearly three years and a-half he had no difficulty in getting two months' leave of absence. He visited his aunt, Mrs. Ponsonby Moore, in Devonshire and subsequently went to Dresden where his own people were living.

On the expiration of his leave of absence he was quartered at Woolwich to be in touch with Colonel Simmons, who was in London, and although he was not going out to Asia Minor again, was superintending the arrangements for James and Gordon to carry on the work of the Commission. Colonel Walpole was the Commanding Royal Engineer at Woolwich at that time, and the only other Engineer officer at the station beside James was Lieut. W. D. Marsh.

In a letter from the Foreign Office, dated 17th April, 1858, addressed by Lord Malmesbury, the Secretary of State, to Lieuts. James and Gordon collectively, they were informed that, at the request of the Russian and Turkish Commissioners, supported by their respective Governments, they were appointed to act as absolute umpires between the topographical officers to be employed in marking the frontier line between Russia and Turkey in Asia Minor. They were instructed to proceed to Constantinople forthwith and report themselves to Mr. Allison, the British *Chargé d'affaires*, who would place them in communication with the Russian Minister and the Porte, with whom they were to arrange their future proceedings. Lieut. C. G. Gordon, R.E., and Dr. Woodfull went by sea with the detachment of Sappers to Constantinople; while James travelled overland. He paid a visit to his mother at Dresden, *en passant*, and then went to Vienna and Trieste where he embarked in an Austrian Lloyd steamer, *Neptune*, for Constantinople.

Digitized by Google

Arriving at Constantinople on the 12th May he lost no time in seeing Mr. Allison, the British *Chargé d'affaires;* he secured the services of Mr. Stabb as interpreter again, and also those of their former cook, Francesco. On returning to Missiré's Hotel he found that Gordon, Woodfull, and the Sappers had arrived. Then he and Gordon went to see M. Boutineff, the Russian Ambassador, Mehmet Pacha, the Turkish Minister for Foreign Affairs, and Ali Pacha, the Grand Vizier. It was arranged that Gordon, with one Russian and one Turkish officer, should take the demarcation of the northern half of the frontier; while James, also with a Russian and a Turkish officer, took the southern half. The Sappers were divided, and Dr. Woodfull was to accompany James, though, in case of need at any time, he was to be sent to Gordon. Mr. Stabb acted as interpreter for James and Mr. Moravski for Gordon. It was further arranged that Gordon should begin work at St. Nikolas and James at Little Ararat, working towards one another, and meet at Alexandrapol to compile the "Cahier de Specification."

Gordon left Constantinople with his section for the east coast of the Black Sea on the 26th May, and James left with his section two days later for Trebizond, in an Austrian Lloyd steamer, and got there on the 31st. Pursuing much the same route as in 1857, James and his section reached Erzeroum on the 16th June, where they found that good quarters had been provided for them by Mr. Hughes, the British Consul. Before leaving Erzeroum on the 24th June, James had to arrange for special runners to bring the letters on to the Commission, as it would be out of the regular lines on which there was a postal service. He entered into a contract with two Turkish messengers to bring the mail to wherever the Commission might be on the frontier. They were to go on foot at the rate of 36 miles, or 12 hours a day. The nearest point on the frontier was about 120 miles from Erzeroum, but the runners occasionally walked half as far again before they found the camp, and, with the unavoidable delays at each end in waiting for mails, they took about a fortnight from the day of their leaving Erzeroum until their return there. They went alternately once a week and arrived with the letters and papers with the greatest regularity. The wonderful feats of pedestrianism performed by these men were paid for at the rate of eightpence per diem apiece! "They used," says James, "to bind their feet with strips of raw cowhide in the Turkish manner, which appeared to give them wonderful power of accomplishing the long daily marches. One of them, quite an old man, had distinguished himself during the war in carrying despatches through the Russian lines into Kars, having done so, we were told, eight or nine times."

The route from Erzeroum to Kars was the same taken in the previous year, and the caravan arrived there on the 30th June. After a five days' halt the journey was continued to Alexandrapol. Here

Digitized by Google

after the usual interchange of civilities with the Russian authorities the British Commissioner was supplied with a Cossack escort, and marched with his section on the 8th July for Aralyk, where he was to meet the Russian Section of the Commission. The route taken was the reverse of that taken the previous year when proceeding from the Ararat range to Alexandrapol. Passing through Karavanserai, Kazafar, Ashtarak, Etchmiadzin, and Erivan, James and his party reached Aralyk on the 16th July. Here they found Effimoski in camp with an escort of 60 Cossacks. With Effimoski were Mirza Jaba, a Georgian, as interpreter, and Count Cassini, a Russian officer of Italian origin, an agreeable man with whom they became very friendly.

The Russian party were heartily pleased to greet James for they had been waiting a month at Aralyk not daring to move as their orders were stringent to await his arrival. Early the next morning the combined parties started on the long and difficult march along a rough track to Sardar Boulak, on the pass between the two Ararats. James entertained his Russian colleagues on arriving at camp. They were not a little astonished at the mock turtle soup, salmon, and other delicacies provided from his Fortnum and Mason stores, which with the roast lamb, vegetables, and fruit from the neighbourhood, and a good English pudding, made a dinner that was a record performance of Francesco under the shadow of Mount Ararat.

The Turkish Commissioner, Souliman Effendi, not having arrived, an expedition was made to Bayazid some 33 miles distant, and other excursions into Persia. Attached to James's party was Corpl. Lawson, R.E., a trained photographer from Chatham with a complete set of apparatus, so that he was able to obtain photographs of all places of interest and his MS. book is illustrated with many of these. At last Souliman joined them, bringing with him an escort of 50 Turkish dragoons and some young officers from the military school at Constantinople.

The first piece of work was the erection of a pyramid, or "marque de bornage," on the water-dividing level of the Sardar Boulak Pass, fixing the position by compass bearings to prominent objects in view, and recording the names of the "temoins" on the part of Russia and Turkey respectively. This was done on the 31st July, and James, having been obliged to begin so late, had much difficulty in persuading his colleagues to work hard enough to get the work done before the season was over. He managed, however, to finish it by the 16th September when the whole party of the southern boundary reached Alexandrapol having fixed all the boundary marks along a line of 230 miles.

James had a very trying time as arbitrator; disputes between the Russian and Turkish representatives were frequent. He says referring to these cases: "I had no power of enforcing my arbitrament,

Digitized by Google

and had no other course than to make a report of the circumstances to our Foreign Office. . . . My colleagues had become very bitter towards each other, and Effimovsky was overbearing and would scarcely speak civilly to Souliman. The latter was of a weak, undecided nature, suspicious not only of Effimovsky but of me, although I was more often on his side than against him. Effimovsky was the better educated, but Souliman was more of a gentleman in manner and dignity."

When the Sub-Committee, of which James was the head, reached Alexandrapol the town was very full in anticipation of a visit from the Grand Dukes Michel and Nikolas. The Governor of Erivan received him courteously and in spite of the crowded state of the town he was provided with very good lodgings. The members of the Northern Section were a week later in finishing their work. James writes: "On the 24th September the entire Southern Section rode out to meet our colleagues, who had completed the demarcation of the northern half of the frontier, and did so about 9 miles from Alexandrapol. As we approached, the Cossack escort performed wonderful feats of horsemanship of a circus nature, galloping backwards and forwards, firing off their muskets, and so on: or they sung in chorus as we marched, in the manner I had so much admired with Russian troops before. On our arrival at Alexandrapol Effimovsky entertained the whole party with a *vin d'honneur*.

"Gordon was given quarters next to mine. We had a great deal to tell each other about our experiences on the frontier; he had had to reconcile differences between his colleagues similar to those which had arisen on my side. But, fortunately for him, the disputes had not been so acrimonious as in the south, for Ogranovitch was a more genial fellow than Effimovsky, and Harif Bey was easier to manage than my own suspicious Turkish colleague. I think the greatest grievance on the north side was the extraordinary energy displayed by Gordon, which had been often complained of by his colleagues, but was good-humouredly alluded to now that the work was over. They declared he used to keep them in the field for such long hours, that they became so tired as to be scarcely able to sit on their horses. They said they had never known such a man, for when they reached camp, and lay down from sheer exhaustion, he would take his gun, and stay out in search of game until dusk. They added that Gordon's horses were as fatigued as they were, and that, one day, one of them actually fell down and died on a mountain side as the section was at work. . . . I can readily conceive that a complaint might with more reason have been made by Gordon of the laziness of his easy-going comrades. If one of the sections had been composed of English officers only, and work had been commenced at Ararat on the date intended, the entire work of both sections could easily have been finished in the one season."

Digitized by Google

Nothing remained to be done at Alexandrapol but the completion of the fair copy of the "Cahier de Specification," or record of the frontier, the boundary marks erected, their distances and bearings from each other and from prominent objects, the names of the local witnesses, etc. This record, or journal of operations, for the Southern Section of the boundary was signed by James and his colleagues on the 2nd October. Then followed farewell dinner parties, and the Commission broke up, each nationality going its own way.

The English Section's first move was to Kars and James sent his interpreter, Mr. Stabb, in charge of the caravan to that town, while he, Gordon with his interpreter, Mr. Mouravski, and Woodfull made an expedition to Tiflis before starting on the homeward journey. The party travelled by tarantasse and were fortunate in finding at Tiflis their old friend, Baron Finôt, the French Consul, who had been their guest on the frontier in the previous year (1857). He accompanied them in making formal visits to Generals Kratka, Krusenstein, Leli, Melutin and other dignitaries, entertained them most hospitably and took them to the theatre, to which they went in full-dress uniform; "Lucia di Lammermoor" was performed by an Italian company "tant bien que mal." After a very interesting and pleasant time they left Tiflis on the 9th October, having visiting Prince Heraklea on the last day of their stay. This Prince was the representative of the former Kings of Georgia. "He lamented much," says James, "that his country was under Russian domination. He would not have dared to speak as he did in the hearing of Russians, but to Baron Finôt and ourselves he was not afraid to assert that the Russian position in Georgia had been gained by intrigue and bribery, and not fair conquest."

Arrived at Kars they decided to reach the sea at Batoum by a new route, by which they were told they could get to Constantinople sooner than by Erzeroum and Trebizond. The stock of stores was so much reduced by this time that the size of the caravan could be much diminished. The party consisted now of James, Gordon, Woodfull, Stabb, three Sappers and three servants. The march as far as Ardahan was uneventful. At Ardahan a fire occurred in the town and the Sappers distinguished themselves in helping to put it out.

On leaving Ardahan they entered a district into which foreigners had seldom penetrated, but they found the English name was held in high respect, and they received the greatest attention. From Ardahan the route turned westward, nearly at a right angle, and gradually ascended the course of the Ardahan Tchai, one of the principal affluents of the Kur. On the 18th October they marched to Agaschan, next day to Kinsithamar, and on the 20th, leaving the river, made a very rough march across the mountain ridge forming a continuation

Digitized by Google

of the Saghanli Dagh and Kanli Dagh, and the dividing line between the Caspian and Black Seas.

Descending to Chevan Ailassi, on the west side of the ridge, the country got more and more wild. They advanced into a deep basin surrounded by mountain crests. From this basin only one narrow outlet existed, between summits scarcely 5 miles apart ; through this outlet the heaped-up waters of a network of torrents forced their way by a narrow gorge and fell into the Tchoruk Sou. "So densely," says James, "is this curious formation of land covered with wood, that, except along the one track from Ardahan through Ardanoutch to Artwin, it is quite impenetrable to horses, the only access to its inner depths being by footways difficult to find, and the only clearings being the slides down the steep slopes, used for bringing timber down to points for transportation by the water courses to the sea, or to some track on which it can be carried to the large towns."

From Ardanoutch to Artwin was a two days' march, and the track became increasingly difficult. On reaching the Tchoruk Sou, they were unable to get across and followed the right bank for some 7 miles to Livana, opposite Artwin. Here they found that there was practically no way in which they could reach Batoum on horseback, and the only route was by a hazardous passage down the Tchoruk Sou in canoes. The 25th and 26th of October were occupied in selling their horses and camp equipage, discharging the caravan and disposing of all stores which could not be carried in the frail craft.

James's account of the descent of the river is too interesting to be omitted. He writes :—

"The boats we embarked in were very frail constructions, being simple canoes dug out of large tree trunks, but we were astonished to see how well they withstood the constant shocks they were exposed to in our perilous voyage. We engaged two canoes, and as our party was ten in number and there were six boatmen, each took eight persons, and this was a pretty tight fit. The boats were mere shells and we lay close together in the bottom. They were also rudderless, but were steered by two men, one in the bow and the other in the stern, with surprising skill. The strong current carried us along at railway speed and it was not necessary to row. Immense rocks jutted from the river bed at every yard, and as the torrent dashed and swirled in foam between them, we seemed every moment destined to be wrecked on some sharp projection. But when it seemed impossible for us to escape, a dexterous twist of the oar by the boatman's wrist would carry us into a safe channel, and it appeared often as if there had not been an inch to spare. The slopes of the hills, which were clothed with trees to the very water's edge, came down precipitously on each side, and had we been fated to upset, in such a rush of water, we could not have hoped to escape with our lives. Until we gained assurance of the great expertness of our boatmen, the excitement of this mode of travelling kept our nerves at a high tension,

Digitized by Google

but we got used to it by degrees, and then it became a very pleasurable experience. . . .

"We stopped at Botscha for the night, a village 25 miles or so from Artwin, and made the boats fast near the bank. . . . Soon after daybreak we recommenced the voyage to Batoum, the experience of the first day being repeated. The distance remaining to Batoum, allowing for the bends in the river and the distance by sea from the mouth of the Tchoruk Sou to the port, was about 30 miles. The swift current bore us along so fast that we were soon at the sea, but it then became necessary to pull, and it was hard labour to propel the unwieldy craft from the mouth of the river to Batoum. The velocity of the river is so great that a volume of mud is projected out for some miles into the sea, and the water on each side of the brown stain thus made, being intensely blue, a rather curious phenomenon presented itself."

The party reached Batoum on the 28th October, and after a few days took passage by steamer to Trebizond and thence to Constantinople. Gordon took the Sappers home by sea. James, after discharging Stabb, who had proved himself most valuable, travelled home with Woodfull, *viâ* Trieste, Vienna, and Dresden, and reached London in the middle of December. He was given leave of absence until the 1st February which he spent at Dresden with his people.

(*To be continued*).

Digitized by Google

TRANSCRIPTS.

HYDRAULICS OF THE CHAGRES RIVER.

By General Henry L. Abbot, *U.S. Army.*

(From the *The Engineering Magazine*).

The real problem of the Isthmian Canal is one of hydraulics—not, as very generally assumed, merely one of navigation or finance. General Abbot's exact and authoritative studies, published in The Engineering Magazine, were among the most important arguments leading originally to the selection of the right project. We are glad to be once more the medium of giving publicity to this paper, prepared at the instance of the National Academy of Sciences (April, 1910) answering affirmatively and emphatically the question, lately raised, as to the sufficiency of the water supply even with the huge locks provided by the present plans.—The Editors.

In projecting a canal across the Isthmus of Panama, the dominating element is not the volume of excavation at the Continental divide, but rather the hydraulics of the Chagres River whose valley must be traversed throughout the greater part of the route. The failure to appreciate this fact largely contributed to the disaster of the first French Company, and it is through the elaborate investigations of the New French Company, supplemented by those now in progress, that the problem has become perfectly understood. The climatic conditions are of primary importance in a study of the hydrology of the river, and they are so different from those of the United States that it is not without interest to contrast them.

The average annual temperature is about 80° F., differing only about 2½° in winter and summer. Ice and snow are unknown. The rainfall is much less irregular than with us, being largely governed by the motion of the sun in declination. The latitude of the Isthmus is about 9° north, and as the sun moves north and south between the tropics it carries with it an ascending current of moist air which, condensed by cold, forms a rain-belt varying in latitude from month to month. Its passage over the Isthmus forms two well-marked seasons; three comparatively dry months, February, March and April, when the sun is far south; two intermediate months, January and May; and seven very rainy months forming the rest of the year. The absence of frost and the comparatively normal rainfall in this region greatly assist hydraulic studies.

It may naturally be asked what river in the United States, where the climatic conditions are so different, most nearly resembles the Chagres in respect to volume of discharge, and thus illustrates the effect of these differences. The Roanoke River of North Carolina affords a good standard of comparison. Above Neal its drainage basin covers an area of about 87,000 square miles with an annual rainfall of about 51″. The studies of the New French Company included the basin of the Chagres

Digitized by Google

above Bohio where the projected dam was located, and where the stream at extreme low water nearly attains the level of mean tide. Above this point the drainage area is about 700 square miles, and the annual rainfall is about 112". In respect to volume at ordinary stages the two rivers are very similar. Simultaneous gaugings in 1896, made respectively by the U.S. Geological Survey and the New French Company for five consecutive months, indicated almost identical discharges—about 5,800 cubic feet per second. The maximum recorded floods of the two rivers indicate 113,000 feet-seconds for the Chagres and 83,000 for the Roanoke, the height attained above low water being respectively about 40' and 30'. At low stages the Roanoke carries the larger volume—as might be expected since its drainage basin is more than twelve times as large.

The topography of the Isthmus also exerts a controlling influence upon the hydraulics of the river. The stream heads in the Cordillera de San Blas forming part of the Continental divide, which is here composed of ridges about 2,000' in height with peaks from 1,000 to 2,000' higher. The river is formed by two main branches, the Pequeni heading near the Atlantic coast in a massive limestone region, and the Chagres in the Continental divide where hard trap rock abounds. The upper tributaries flow through canyons cut deeply in the rock, with numerous rapids and falls. The two branches unite at Dos Bocas about 19 miles above Gamboa, where the line of the Canal is reached. In this distance the fall in water surface at low stages is about 80', with many rapids. The channel is often bordered by limestone bluffs undercut by the torrents and passing gradually below the stratified sandstone of the lower river. The entire region is covered with a dense tropical forest. Near Gamboa the general direction of flow changes nearly at right angles, from south-west to north-west, and the river joins the route of the Canal. Here the low-water surface is about 46' above mean tide. At Bohio 20 miles below it hardly differs from that of mean tide, although the distance to the sea is about 27 miles. The tidal range on this coast is insignificant, varying between 6" and 2'; but the fact that the river in the last 27 miles of its course has little or no energy in reserve to transport its water to the sea, is one of the most important of its hydrology for canal purposes. The accumulation of water to supply the needful head causes Bohio to be the point where is noted in great floods the maximum rise, about 40'. Such natural conditions near the mouth are phenomenal. At New Orleans, 100 miles above the head of the Passes, the total range is only about 14', to compare with 51' at Cairo, more than 1,000 miles above.

Another peculiarity of the Chagres, which attracts the attention of an engineer, is the nature of the river bars—especially in the 11 miles of channel next above Gamboa. They differ widely in composition; some are of fine sand, others of pebbles, others of rounded stones three or more inches in diameter; there is little or no mixing of materials. The explanation will be found in the peculiar regimen of the river. In the dry season the Chagres is a gentle stream which, as we shall see, is largely fed by water percolating from the soil. In the rainy season its character is quite the reverse. The sudden cloudbursts upon the

Digitized by Google

mountains, often lasting two or three days, create torrents in the smaller tributaries which uniting in the river bed pass downstream like great waves. In the narrow canyons of these headwaters the elevation of the water surface often attains heights of 40 or 50′ in four or five hours. Several times the surveying parties were endangered by these rises, and indications were not lacking that in great floods they are largely exceeded. In the main stream the heights attained above low-water level are of course much less, but even here the volume carried may range in 24 hours from 2,000 to 40,000 or more cubic feet per second, with corresponding variations in transporting power which easily explain the sorting of the materials forming the bars.

Since 1883 automatic records have been made at Gamboa, showing hourly water levels, and their study has developed interesting facts. The normal height in the rainy season is about 10′ above extreme low water, and the number and duration of the freshets above this height year by year, afford a trustworthy estimation of the relative volumes carried and hence of the relative rainfall producing them. The annual average shows 19 freshets lasting 221 hours, ranging from 5 freshets lasting 37 hours in 1902 to 46 freshets lasting 709 hours in 1887. Furthermore the grouping of consecutive years is suggestive. From 1883 to 1894 inclusive, 12 years, the average annual number of freshets was 28, lasting 354 hours, while for the next 12 years it was only 10 lasting 86 hours. During the last two years the average has again increased, being 20 lasting 298 hours. It may be added that studies of the rainfall records and measured discharges of the river are in perfect accord in confirming this progressive variation in annual rainfall and stream flow. During the operations of the first French Company the most unfavourable conditions were the rule. Heretofore the American engineers have been specially favoured, but the latest records suggest that a change may perhaps be apprehended in the near future. Excessive rainfall of course is unfavourable to rapid excavation and concrete laying. During last year the number of freshets was considerably above the average, being 27 lasting 466 hours, but it may be noted that they did not materially retard progress.

Aside from these considerable freshets, great floods are a characteristic feature of the regimen of the Chagres. They also occur periodically. The first of record since the opening of the Panama Railroad in 1855 occurred in 1879, and inundated all the low lands of the valley. Four more occurred between 1885 and 1893, these nine years being included in the period of excessive rainfall; 12 years of exemption followed; since then two great floods have occurred, one in 1906 and the other in 1909. These floods are always of short duration, hardly exceeding 48 hours, but they carry immense volumes and submerge large areas in the lower valley.

The close vicinity of the route of the Canal to this turbulent river; the fact that near Gamboa its bed is about 45′ above mean tidal level, demanding a complex system of dams and artificial channels to protect a sea-level canal against inundation, and the further difficulties caused by the excessive tidal range in the Bay of Panama, which may equal 20′

Digitized by Google

twice daily, early convinced the engineers of the New French Company that a sea-level construction was out of the question, and that the Chagres must be regulated by a great artificial lake to be entered by shipping by means of locks, the only manner by which the torrential neighbour can be perfectly controlled. This decision entailed an elaborate study of the hydraulic conditions on the Isthmus in connection with the question of water supply for lockage in the dry season. The discharge of the river was regularly gauged, beginning in 1890, and a fund of information now of great value to American engineers was collected. Space does not permit even a summary of these hydraulic investigations, but one matter of interest from a scientific point of view may be considered, namely the ultimate disposition of the rainfall.

As is known to everyone, of the rain which falls upon the surface of the earth one part flows directly to the sea through the channels of the rivers; another part soaks into the ground, of which much the larger portion gradually percolates to the river beds and thus reaches ultimately the same destination while the remainder is consumed in the subterranean chemical changes in progress; the third part is returned to the atmosphere by evaporation, either directly or through the medium of plant consumption. The relative percentage of these three parts has an important bearing upon the question of the water supply of a canal with locks, and was the matter to be elucidated. Many streams are known to receive large volumes of water by percolation through the ground, the amount depending largely on the geological character of the soil. The absence of frost and the exceptional regularity of precipitation on the Isthmus specially favour the study of this element of the problem.

The daily outflow at Alhajuela, Gamboa, and Bohio had been carefully gauged during about six years. The catchment basin above the latter covered an area of about 700 square miles, divided into three sub-basins of known area in which the average rainfall varied somewhat, but where a sufficient number of observing stations had been occupied to afford a fair knowledge of the relative and absolute precipitation in each. These data permitted a satisfactory analysis of the ratio between downfall and outflow throughout the entire district—the gauged outflow being of course transformed from the usual unit of cubic feet per second to the height in inches to which 1 square mile of surface would be covered by the flow, thus giving figures directly comparable with the rainfall in inches.

The resulting values of the ratio month by month revealed the laws governing ground-water flow. It was found that the minimum value about 0·3, occurred in May; and that from that date the ratio regularly increased month by month to about 0·75 in November, when both rainfall and outflow are at their maximum. It then rapidly passed to fictitious values above unity, indicating an outflow larger than the rainfall; and so continued, reaching a maximum of about two units in February, to a date between March and April when it dropped rapidly to the minimum in May.

The explanation of these figures is manifest. The soil acts like a sponge; at the end of the dry season the subsoil water reserve has nearly or quite drained out adding little or nothing to the river flow;

Digitized by Google

during the following rainy months its volume gradually augments, discharging more and more through the river bed, until when the dry months arrive its contribution constitutes by far the larger part of the entire flow. The determination of the numerical values of the ratio, month by month, permits an easy computation of the actual volumes of the ground-water flow. The annual average represents about one-third of the total rainfall. In round numbers the general results of the study indicated for each square mile of this tropical river basin are an annual rainfall of 111″; a total outflow including ground water of 73″; and a surface evaporation, represented by the remaining rainfall of 38″. As compared with the north-eastern portion of the United States these figures indicate about two and a half times the precipitation, three and a third times the outflow, and one and a half times the surface evaporation.

Since the American operations began, the same system of careful observations has been continued, with a large increase in the number of the rainfall stations; another six years have now passed, and it is not without interest to submit the records to the same analysis and thus to compare the results. This I have done, and find the accordance to be so extremely close that it suffices to present in tabular form figures showing the average results for the past twelve years. As all but the last year or two pertain to the minimum period of the progressive variation in rainfall, deductions from them in respect to the water supply of the Canal are certainly safe and conservative.

The available volume is demonstrated to be more than adequate, even with the immense locks provided for the accommodation of modern shipping.

RAINFALL AND OUTFLOW ABOVE BOHIO, 700 SQUARE MILES. TWELVE YEARS, 1898 TO 1909 INCLUSIVE.

Months.	Rainfall inches.	Outflow inch-mls.	Ratio.	Outflow in feet-seconds. Total.	Direct-flow.	Ground-water.
January	4·55	5·74	1·26	3477	828	2649
February	1·18	2·40	2·03	1612	238	1373
March	1·16	1·61	1·39	979	211	768
April	3·77	2·05	0·54	1284	713	571
May	11·45	4·13	0·36	2509	2090	419
June	11·30	5·73	0·51	3592	2114	1478
July	13·75	7·29	0·53	4425	2504	1921
August	13·47	8·14	0·56	4940	2646	2294
September	11·27	8·07	0·71	5055	2136	2919
October	13·63	10·01	0·74	6074	2463	3611
November	18·25	14·19	0·78	8904	3425	5479
December	8·13	10·70	1·31	6499	1488	5011
Year.	111·91	80·06	0·71*	4113	1738	2374
Dry (3)	2·04	2·02	....	1291	387	904
Rainy (9)	11·76	8·22	....	5053	2188	2865

* Quotient of aggregates.

Having by actual measurements and by deductions therefrom, reached a precise valuation of the probable monthly downfall and outflow

Digitized by Google

from the catchment basin above Bohio, ground water included, it remained to consider the third element of the lock canal problem—the probable evaporation from the projected lakes. No direct observations to determine evaporation from exposed water surfaces had been made on the Isthmus; but they had been made on Lake Nicaragua for 94 months by the Walker Commission, indicating an average of 0·18″ per 24 hours. That evaporation from the general surface of the country must be less than that from exposed water surfaces is certain; but the fact that rain falls at Bohio on 254 days out of the 365 days of the year, and at Gamboa on 204 days, (averages based on 11 years of records) would indicate that the difference between the two is probably not very material in this tropical region. At any rate a check upon the Nicaragua observations might be had by assuming that the residue of the rainfall after deducting the total outflow would represent the evaporation from the general surface of the country. This computation could not be made month by month, because the rate of flow of the ground water in reaching the river bed is unknown; but the mean annual figure representing a complete cycle is not affected by this circumstance. It indicated a loss by evaporation per square mile over the entire surface of the catchment basin above Bohio of 0·11″ per 24 hours.

During the last three years direct evaporation measurements on exposed water surfaces have been made by the Commission—for two years at Bas Obispo near the middle point of the Isthmus, for two years at Cristobal on the Atlantic coast, and for two years at Ancon near the Pacific coast. The figures differ but little at the three stations, and may be thus summed up, expressed in inches evaporated per 24 hours.

	Annual.	Dry months (3).	Rainy months (9).
Atlantic coast	0·114	0·228	0·100
Central district	0·141	0·185	0·122
Pacific coast	0·117	0·178	0·091
Averages	0·124	0·197	0·104

The general accordance between figures reached by so different methods is certainly striking; and the fact that the new measurements show that evaporation in the three comparatively dry months is nearly double that in the rainy season is a further confirmation of their accuracy, and incidentally of the value of the method of analysis by the use of the ratio between rainfall and outflow. It may be added that the latter when applied separately to the catchment basins above Gamboa and Bohio indicated a small escape by percolation under the dam site at the latter place, a fact confirmed by borings. Unfortunately the application of this method in temperate regions is rendered difficult by reason of complications introduced by ice and snow, and by the more irregular rainfall. In fine, on the Isthmus it may be considered as well established that of the total volume of the rainfall about one-third escapes directly through the beds of the streams, another third finally reaches the sea by the same channels as ground water, and the remainder returns to the atmosphere by evaporation.

Digitized by Google

NOTES ON PHOTOGRAPHY IN THE TROPICS.

By Capt. H. G. Le Mesurier, R.E.

Reprinted by the kind permission of the Editor, *Photography and Focus.*

The experienced amateur nowadays who remains at home, usually employs a first-rate hand camera for his negatives, and enlarges in the long winter evenings, and a more commendable method of passing his time would be hard to find. But, transplant him. Assume that he accepts an engagement in Bombay or Singapore and attempts to continue his English practice; what will be the result?

Well, if a man of a certain type, he may keep it up for a time, but in the end, in nine cases out of ten, the latitude, the climate, and, perhaps most of all, the social habits of the tropical Briton, will force him to modify his methods.

In the first place he has lost his winter, and to a great extent his evenings. When he has finished his work for the day, he will not find himself with the residuum of energy necessary to ensure the production in a stifling room of half-a-dozen twelve by tens. If he does not obey the call of nature for exercise in the open air in the cool of the evening, he is likely ere long to cease altogether to take an interest in photography, or any other earthly subject. Having taken the exercise necessary for his health, he will finish the evening up to dinner time (8.15 p.m., or later in the East) with his family, or at the club—an institution to which the most "unclubbable" man takes in the tropics. As to enlarging after dinner—Heaven forbid.

I am quite aware that in many places in the East it is quite *possible* to work on English lines for a few months in the cold weather, but the average amateur will find that the physical and social life he leads will probably prevent him from doing so. As there is no object in taking out apparatus he will rarely use, I recommend, therefore, that the Eastward-bound photographer should sell his enlarger before starting.

A Large Size Field Camera.

If he wishes to make pictures of a reasonable size for framing, my advice is to bring a field camera of the largest size he is likely to use, and have the dark slides nested with carriers. This is preferable to sending his hand-camera negatives home for enlargement, owing to the

Digitized by Google

expense and risk such a course entails, while, on the other hand, the inconveniences attendant on the use of a large and heavy camera do not exist in a land where the cost of porterage is nominal.

At the same time, he should bring his hand camera with him if of a suitable type, as he will find almost unlimited opportunites for its use. If only one camera can be afforded, I recommend the 5 by 4 size as the best compromise, particularly for work in Indian cities. I have found this a better all-round size than the newer "postcard" shape, and the plates are more easily procurable. If, as I advise, a field camera of large size forms part of the amateur's equipment, I should be inclined to recommend the purchase of a stereoscopic hand camera of the 45 by 107 m.m. size for those who are interested in stereoscopic work, or else of a quarter-plate.

As to the best class of field camera for use in trying climates, I think there can be no two opinions among experienced workers. The square bellows solid-fronted type stands alone. The modern flimsy folding camera is designed for the man who has to carry his own gear, and is consequently as light as possible; to this quality everything is sacrificed, and the result is a rickety unstable contrivance which, after a few months' use, or a few weeks' neglect, in a really bad climate, can be relied on to fall to pieces. It is true that the higher-priced cameras of this type by the best makers will render a better account of themselves if looked after, but, however well made, they are never as rigid or accurate as those of the heavier class, and are far more affected by climate.

My experience is that a 10 by 8, or whole-plate square form camera, is best bought second-hand, after careful inspection of course. Such cameras by the best makers, and in good working condition, can usually be bought for a mere song nowadays.

Concerning the Tripod.

The tripod is at least as important as the camera, and should be carefully chosen. I found Ashford's stands excellent in India for ordinary work, but for telephoto work in exposed situations a heavy solid-legged stand of the type, used formerly for levels, cannot be improved on, though it may necessitate an extra coolie to carry it.

So-called "Tropical" Cameras.

Of late years "tropical" patterns of thin cameras have been introduced by several makers, made of teak, and brass bound, tongued, and pinned. I have had the opportunity of comparing the behaviour of one such with another by the same maker, but of his "regular" type. The former was far the better, and perceptibly more rigid. Why teak should be considered so much better than mahogany for the tropics, however, is not very clear; nor why an extra charge should be made for using this wood, a fine quality of which costs about 7s. a cubic foot in Calcutta. Thoroughly well-seasoned mahogany is more easily procured than a

Digitized by Google

similar quality of teak, and will stand a uniformly dry or damp climate better, though the latter wood is superior where hot and damp and cold and dry seasons alternate. I have seen a camera of the old sliding box type, made of mahogany by hand and properly dovetailed, though without any brass binding, which was in perfect order after being 30 years in Darjeeling, with a rainfall of about 100 inches per annum.

To sum up, the field camera for the tropics should be of strong heavy build, of the very best workmanship, and of thoroughly seasoned best quality wood. If the joints are properly designed, as they were 20 years ago, brass binding is unnecessary, though never harmful. The bellows should be joined to the camera with brass plates, and all the screws should be brass. A turntable is almost certain to give trouble in very damp weather, even when well made, and is better done without. A useful precaution is to take a duplicate bellows in case of accident.

The dark slides should be of the best quality book form, with double rabbeted hinged shutters. If bought second-hand, the cloth hinges should be renewed. Of all the "plate-holders" (solid form dark slides) on the market I only know one, the "Xit" pattern, which will stand the tropics, and this, unfortunately, is not, I believe, made in the larger sizes. Metal single plate-holders are particularly unsatisfactory, as the plush cut-offs rapidly deteriorate from damp and insects.*

The Hand Camera—A Specification.

The best form of hand camera for extreme climates is, unfortunately, one of the bulkiest; I refer to the magazine-changing type. This method of changing plates is more reliable than dark slides or changing boxes, and, if well made, never gets out of order. The commercial hand cameras to which this changing arrangement is fitted are, as a rule, of inferior manufacture, and cannot be recommended. A specification of such a camera which would stand the worst climates and could be produced at a reasonable price would be as follows:

Size.—$4\frac{1}{4}'' \times 3\frac{1}{4}''$ [or $5'' \times 4''$ if no other camera is used]. To carry 12 plates.

Body of Camera.—Best thoroughly seasoned teak, brass bound—edges and corners rounded. Highly french polished.

Back Door.—Undivided, brass tongued, secured to body by "port-hole" fastenings on both long sides; the door should be removable.

Shutter.—Compound; latest pattern.

Lens.—Focussing Cooke, Series III., 5" focus. Lens to be mounted on rising front panel for horizontal way of camera.

Changing Arrangement.—Approved type hand-made in brass. Plates to change horizontally.

Finders.—Two large best quality ground-glass type for horizontal way, one set to show full rise of front, the other the view with lens

* This is not the case with the excellently-designed plate-holder issued with Messrs. Butcher's Stereolette camera.—H. G. Le M.

Digitized by Google

central. Finders and rising front to be marked with corresponding horizontal lines. One finder the vertical way of plate.

Levels.—T form, set flush, tripod socket and leather-covered chain handle.

The sheaths should be of rustless metal, not aluminium. All screws should be of brass. The finders should have brass folding hoods. A circular brass cap screwing into a brass ring should be fitted over the lens and shutter. An Antinous release should be provided, and a leather sling case. For the most extreme climates, such as that of Central Africa, the camera should be lined internally with thin sheet brass, and the lens should be mounted on several thin brass washers, one or more of which could be removed in case of any swelling of the woodwork of the camera.

Folding hand cameras, in which the base board drops on opening the camera, give trouble sooner or later from climatic causes or more commonly from accident. It is a simple matter to get a camera repaired at home, but quite another thing when the accident happens on the Burmese frontier; and the less complicated the apparatus the better, therefore. Many cameras of this type have refinements which are only rarely of use, and a positive source of danger unless the workmanship is of the very best quality.

A Reflex in the Tropics.

Reflex cameras, if of the very best workmanship, stand a moderately bad climate much better than might be expected; but cannot be relied on in excessively damp localities. Their most vulnerable point is the silvered mirror, and after that the shutter blind. Those taking these cameras to the tropics should carry with them a replica of the mirror in an air-tight case; it is easy to fix in a well-designed camera. If specially ordering such an apparatus, brass screws throughout should be specified, as makers are in the habit of using blued steel screws, which rust very rapidly.

A twin-lens camera, in spite of its bulk and other disadvantages, is a more reliable apparatus for the East; they can be picked up second-hand at astonishing figures.

I have yet to meet an experienced worker who has a good word to say for roll-film cameras in the tropics. They are all very well for the tourist, in fact almost essential, but it must be remembered that the globe-trotter visits the East in the cold weather only, and has everything in his favour. I have been told by an explorer that in parts of Central Africa the life of a film is about *six hours;* that is to say, he found it necessary to develop his spools within six hours of their removal from their air-tight tin cases, and even then his results were not always satisfactory. Cameras using flat films give trouble either from the films curling in a dry atmosphere or sticking to their neighbours when the air is saturated with moisture.

Digitized by Google

Lenses and Finders.

In the tropics the light is usually so good, when outdoor work is possible at all, that considerable stopping down is possible with "instantaneous" exposures; a good rapid rectilinear lens of reasonably long focus is therefore by no means to be despised, particularly for street work where curvature of field is an advantage.

"Brilliant" finders are to be avoided in the East; the glare is too much for them. Well-made ground-glass camera-form finders are the best, and should be provided with folding hoods. An auxiliary concave finder with a blue glass magnifying lens is a valuable addition to any camera, but it is not everyone who can use it.

Shutters and Climate.

A simple type of focal plane or other roller blind shutter, stands a moderately bad climate better than might be supposed, and is more regular in speed than the cheaper metal "between-lens" shutters; there is, however, no question that the best shutter for the tropics is one of the very high quality examples of the latter type now obtainable.

Plates and Films.

If kept in hermetically sealed metal cases, most modern plates will keep almost indefinitely, which was by no means the case 10 or 15 years ago; but once exposed to the humid atmosphere of the tropics their behaviour varies considerably. The best keeping plates in my experience are made by a well-known American firm; they are, however, so badly cut that over 10 per cent. are useless, and I do not propose to give their producers a free advertisement. My own practice is to import plates in closed cases, and seal them up on arrival in separate tins, the lids of which are closed with sticking plaster, and can be used as often as required. Isochromatic plates do not keep nearly so well, and should be used within three months of receipt; the same applies to backed plates. The relative speed of plates has little or nothing to do with their keeping qualities.

Flat films keep very fairly well if treated as just described, and I find that isochromatic films keep considerably better than plates of a similar type. I have kept Austin Edwards's films for two years in hermetically sealed tins, and "Kodoid" plates are also reliable, though, owing to the fact that they stretch unequally in some climates, it is advisable to stop down to f/11 when using them to ensure sharpness.

Printing Processes.

Carbon and platinum printing can only be indulged in certain parts of the tropics, and then, as a rule, only in the drier seasons. This is particularly unfortunate, as not only are the results permanent, but these papers are also less liable to attack by insects than any other. Bromide

Digitized by Google

papers are little trouble to work at any time, but the results are not permanent, and insects, particularly the distinctive "silver fish," seem to prefer this paper to others. A well-fixed and washed P.O.P. print is far more permanent than a bromide, but many brands give endless trouble in working if ice cannot be procured; so-called "hardening" baths are a very poor substitute. A brand of "Solio" P.O.P. recently issued is free from this defect, and can be worked in water at 85° F.

Collodio-chloride paper can, of course, be worked at any temperature, but in dry weather it rolls up into nothing and cracks all over.

Self-toning papers are absolutely useless except for purely temporary purposes, as they will not keep either before or after fixing. Gaslight papers are, as a rule, less permanent even than bromide; to this rule "Velox" is an exception.

The new phosphate papers after a sea-voyage, arrived stuck tight together; those I have been able to separate and print are mottled and discoloured at the back after development.

Photographs one wishes to keep in the tropics should not be mounted or placed in an album, or they will be destroyed by damp and insects. My own practice is to store them loose in a specially made air-tight tin case. If mounted and framed, the back of the frame and the inner side of the rebates should be covered with paper which has been steeped in a solution of corrosive sublimate or similar poison and carefully dried; this is a necessary precaution against insects.

Accessories.

A large stock of chemicals should be brought out with one, as they are very expensive abroad. Eightpence a pound is quite a common price for "hypo," for instance. It is particularly advisable to bring any chemical required which is not in common use.

Printing frames should be of the best quality, and screwed at the corners. Developing dishes should be of enamelled iron. Spare focussing screens should be brought out. A valuable accessory is a daylight developing tank, with a corresponding changing bag. The tropical darkroom is a favourite resort of centipedes, scorpions, and other "small deer," not to mention snakes, and the less time spent in it the better; I personally have done without one for some years. In conclusion it may be said that while photography in the tropics is certainly a little more troublesome than at home, the difficulties are by no means insurmountable, and are as nothing compared to those our immediate predecessors in the study of the black art had to encounter; I can only hope that what I have written may serve to indicate what the difficulties are, and assist brother photographers proceeding abroad to avoid them.

The writer of the above makes the following specific recommendations for R.E.'s:—

Dealers.—Serious disadvantages that often occur when dealing with the

Digitized by Google

export departments of many London houses, are well known to professional photographers in the East. There are exceptions, and such a firm as "The Westminster Photographic Exchange, Ltd.," 119, Victoria Street, can be relied on to carry out an order with common sense and expedition. This firm is run by practical men, who can be trusted to choose a new or second-hand camera to meet one's specification.

Hand Cameras.—Watson's field cameras are excellent. Meagher's cameras were the best some 10 or 15 years ago: the firm is no longer in business, but their cameras are well worth buying second-hand.

Among cheap portable half-plate sets, of which there are so many on the market, about the best is the Thornton-Pickard "Imperial" with Aldis lens—priced at 85s. complete. Such an apparatus however would not compare in durability with a high quality square bellows camera bought in good second-hand condition: it is given merely as a good example of value for money. For those who wish to do difficult architectural work the "Tropical" Sanderson is about the best made, but not so rigid for outdoor work as the square form.

Hand Cameras.—Besides those mentioned in the text Voigtländer's "Alpine" camera (quarter-plate) is specially suited for the tropics; it should be ordered without leather covering and with German silver dark slides. One or two extra of the latter should be carried as they are of metal with plush cut-offs and sometimes get out of order. This is about the best of "double extension" hand cameras, and is usually fitted with "Collinear" lenses.

Among the smaller stereoscopic cameras, now deservedly popular, is the "Stereolette" made by Butcher for 45 × 107 m.m. plates, which, while very well suited for the tropics, is astonishingly cheap (£3 10s.). The body is of metal throughout. For this class of work it is more important that the lenses should be accurately paired than of very fine quality, and those supplied are quite good enough. The two cameras of this type mentioned in the text cost about £20 each.

Plates.—"Imperial" plates are specially recommended for their keeping qualities and general excellence. For use with the "Verascope" and similar 45 × 107 m.m. cameras, [which necessitate very accurate cutting of the glass], "Imperial Flashlight" plates are the best made.

Developing Tanks.—The "Standa" is the simplest, and should be bought made in *nickel*; the zinc pattern corrodes.

Developers.—For men who are often "in camp" a developer, such as pyrocatechin, which does not suffer from the accidental presence of a little hypo, is useful, as development is often carried out under difficulties.

Printing Papers.—Of P.O.P. Ilford seems about the most permanent, but requires the use of ice in the hot weather. The writer has a framed Ilford P.O.P. print made at Karachi in April, 1900, which has been hanging up in various parts of India and Mauritius ever since, and might, from its present appearance, have been toned and fixed yesterday.

Digitized by Google

The best bromide papers for bad climates seem to be "Wellington" and "Kodak," and the best developer for them amidol.

Isochromatic Screens.—Although, for the same result, they are much slower, tinted glass are better than gelatine screens, as the latter fade rapidly in strong light. Those made by Aldis Bros. are excellent.

Accessories.—The best dishes for the East are best quality real enamelled steel. Unbreakable celluloid measures are useful, but cannot be used for certain chemicals. Any mounts wanted should be brought out; it is difficult to get tasteful ones abroad. If much mounting is done it is worth while to purchase a small size "dry-mounting" machine; the adhesive tissue is much more likely to stand the climate than starch paste.

Digitized by Google

THE FORTIFIED POSITION OF NAN SHAN AND THE KUROPATKIN REDOUBT.

(*Continued*).

II.

The Kuropatkin Redoubt.

(*By* Major Don Augustín Scandella in the April number of the *Memorial de Ingenieros*).

In writing the following pages the works of the undermentioned authors, who were present at the Siege of Port Arthur, have been consulted, viz. :—Messrs. Ashmead-Bartlett, B. W. Norregaard, David James, and Lieut.-Colonel von Schwartz. Note has also been taken of the monograph published by the German Great General Staff; of the conferences held at the Centro del Ejército y Armada by Major Herrera de la Rosa, Spanish Attaché with the besieging army; of the lecture delivered at the Engineer Academy at Guadalajara by the Japanese Major Tsunoda, who was on the staff of General Nogi during the siege; and lastly use has been made of the information and plans contained in the official report of Major Sir Alexander Bannerman, R.E. who was attached to General Nogi's Army.

Ground outside Port Arthur.—The extraordinary influence which ground exercises in warfare, compels the chronicler of every feat of arms to describe first of all the district in which it took place so as to enable the reader thoroughly to understand it. The nature of the country and the relative position of the localities occupied by the belligerents will be seen from *Plate* III.

The attacks against the Kuropatkin Redoubt, which form the subject of this article, were some of the numerous episodes which contributed to the surrender of the fortress and logically cannot be disunited from the series of operations which formed the Siege of Port Arthur.

An army which endeavours to invade the Kuan-tung Peninsula from the east is met by three mountain barriers normal to its line of march, and which can be used as lines of defence by the besieged garrison.

First Line.—The general direction of this line is from north to south, and the hills which form it are very precipitous, rising to a height of nearly 1,000′. It is traversed by three roads which start on the east from the Isthmus of Kin-cho, and join in the west at Port Arthur. The first of these roads runs along the north coast as far as the Bay of Ying-cheng-tsŭ, where it turns south towards the fortress. Parallel and close to it is the railway. The second and central road crosses by the Pass of An-tsu (Anchirei) and ends in the valley of the River Lung.

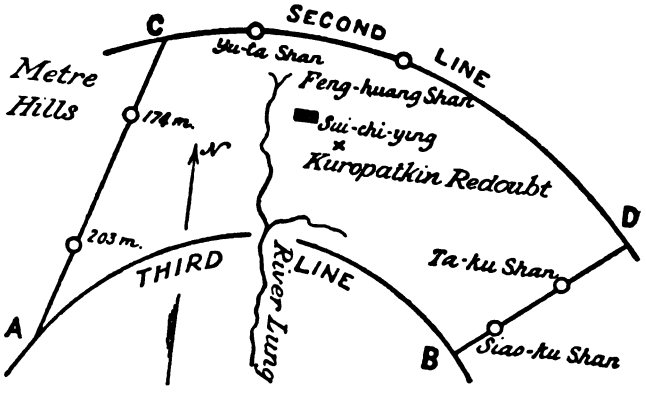
Second Line.—If an arc is described with the middle of the Bay of Port Arthur as centre and a radius of 9 or 10 kilometres, this curve will represent the general direction of the second defensive line, which commences on the south on the right bank of the River Tai, and ends on the north close to Luisa Bay.

Digitized by Google

Third Line.—Another arc, struck with a radius of 4 or 5 kilometres follows approximately the crests of the hills which surround the Bay of Port Arthur from east to west. This range is cut from north to south by the valley of the River Lung. On the numerous spurs which run out from it towards the front, the Russians had constructed a series of forts and batteries, connected by trenches and entanglements or by the old Chinese wall, which formed an almost continuous line, especially in the sector east of the River Lung.

Two mountainous masses jut out from the extremities of this Third Line, approximately from south-east to north-east. The eastern mass is formed by Ta-ku Shan (Taikosan) and Siao-ku Shan (Chokosan), and the western by the series of hills which are jointly known as the "Metre Hills," on account of each of them being usually called by its height in metres. These masses close on the east and west the circular valley between the Second and Third Lines. The ground in this valley is undulating and with little vegetation.

The accompanying figure shows the relative position of the principal topographical features which have frequently to be referred to in this article.



Line AB represents the third defensive line of the Russians and the two sectors into which the River Lung, shortly before falling into the Bay of Port Arthur, used to divide the line of the principal forts will be noticed. The eastern sector contained three permanent forts which served as pivots of defence, and which were called, after the hills on which they were built, viz., Ki-kuan Shan (Kitajodai), Er-lung Shan (Niriusan) and Sung-chu Shan (Soyusan). There were numerous intermediate works which were, for the greater part, built or remodelled after the outbreak of hostilities, and which were connected with each other and with the forts by trenches or by the old Chinese wall, and all were provided with a profusion of accessory defences. This continuous line presented a small salient to the north-east of Wang-tai (*Plate* III.) formed by the two earthworks, known as Pan-lung Shan (Banliusan), which played such an important part during the siege. Wang-tai (Bodai) was the first and principal objective of the Japanese. The forts in the western section did not intervene in so active a manner as the western ones.

Line CD represents the second defensive position of the Russians, which when once in the power of the Japanese was used for their siege works.

Digitized by Google

The spurs of Yu-ta Shan and Feng-huang Shan (marked on the sketch by two small circles) were utilized by the besieger as the sites of numerous batteries, camps, etc., defiladed from the enemy's view.

The line BD passes through Siao-ku Shan and Ta-ku Shan, and AC represents approximately the general direction of the Metre Hills, but only 203 and 174-Metre Hills are marked.

The chief events of the Siege of Port Arthur took place in the area ABCD.

Situation and Description of the Kuropatkin Redoubt.—With the double object of closing the valley of the Lung and of protecting the springs which provide the fortress with water (see *Plate* III.), the Russians constructed in the centre of the area ABCD two lunettes and two redoubts. The most advanced and most important of these works was known by the Japanese as the Red Redoubt on account of the colour of the ground around it. The Russians called it the Kuropatkin Redoubt, and it is known by this name to all the writers who have written about it. When this work fell into the power of the besiegers the Russians hastened to bombard it with their heavy artillery, whilst the Japanese destroyed its shelters and made various alterations so as to make it defensible. In consequence, the redoubt was so changed that in order to obtain sections of it and to ascertain certain details of the assault, Major Sir A. Bannerman had to get the assistance of his Japanese colleagues who had contributed to its destruction. The following observations may serve as a complement to the plan and sections given in *Plate* IV. The work was built round a rocky hillock and the ditch was excavated in very hard ground, the result was, that in spite of the great amount of work that was expended on it, the parapet had an exaggerated relief. The ditch of the gorge was flanked, as was also the face marked 2—3 on the plan. The trenches which started from the salients 3 and 6 were deep, and were provided with sandbag loopholes, and their trace was such as to enable them to flank the glacis. The whole of the parapet of the redoubt was provided with head cover, and at every 20′ there was a traverse, not shown on the plan (see section CD). The timber of the shelters was generally square in section, with 10″ to 12″ side. Iron plates, 9·5 m.m. thick, were used in the construction of the blindages, in the sections CD, EF, LM and NO.

The garrison and armament of the redoubt consisted of one company of infantry (200 men), a small Hotchkiss gun mounted in the eastern salient, and two machine guns to flank the ditches.

The besiegers penetrated into the work by the breach which had been made in face 1—2. It is stated that a considerable difference was found in the state of preservation of the different shelters, those that were protected by sheet iron being in a better condition than the others, though even these latter had not suffered great damage. It should be remarked that the blindages provided with iron cover were smaller than the remainder.

The artillery employed by the Japanese against the Kuropatkin Redoubt consisted of 3-inch Arisaka field guns, 4·7-inch howitzers, and 3·5-inch mortars, the former at a range of 3,100 yards and the rest at 3,550 yards. After the work had been captured, the Russians fired at it with 6-inch and 8·7-inch howitzers which caused much damage.

Digitized by Google

Neither the mine gallery which ran out from face 2—3, nor the mines prepared by the Russians in the ditch, proved of use in the defence. None of the mines exploded. Hand grenades were used in large quantities by the Russians.

Operations of the Japanese.—Immediately after the Battle of Nan Shan on the 26th May, General Oku effected one of the most interesting manœuvres of the campaign, by changing front with the 3rd and 4th Divisions which had taken part in the battle, and moving them northwards, in union with other troops which had disembarked at Pi-tsu-wo, to fight and win a fortnight later (15th June) the Battle of Te-li-tsu or Wa-fan-go (Tokuriyi); and meanwhile the 1st Division, commanded by Prince Fushimi, captured Dalni, and awaited in the neighbourhood of Nan Shan the incorporation of the other divisions to form the army to besiege Port Arthur under General Nogi.

The siege may be considered as being divided into two principal parts, the first from the Battle of Nan Shan (26th May) to the 31st July, on which day the Japanese occupied the Second Line (see *Plate* III.), and the second, which commenced on the last-named date and ended with General Stoessel's capitulation on the 5th January, 1905.

First Part of the Siege.—The following is a list of the chief engagements between the 26th May and 31st July and of the losses suffered by the Japanese in them:—

(*a*). 26th June. Occupation by the Japanese of Wai-to-Shan (Witosan) to the west of Dalni. Losses 250 men.

(*b*). 26th June and 3rd to 5th July. Hard-fought engagements on Ken Shan (Kensan). This mountain which commands the whole district forms an advanced position of the 1st Line. Losses 760 men.

(*c*). 26th to 28th July. Defeat of the Russians holding the 1st Line. Losses 4,900 men.

(*d*). 31st July. General Nogi's troops captured the 2nd Line and the Russians retired to the 3rd Line. Losses 1,200 men.

During the months of June and July the Japanese, at the same time as they were invading the Kuan-tung Peninsula, were concentrating in it the troops and material necessary to commence the

Second Part of the Siege.

(*e*). 7th to 9th August. The Japanese attacked and captured Ta-ku Shan (Taikosan) and Siao-ku Shan (Chokosan). Losses 1,200.

(*f*). 13th to 15th August. Capture of 174-Metre Hill (Takasikayama). Losses 1,500 men.

(*g*). 19th to 20th August. First general attack. The principal objective of the Japanese was to gain possession of the hill of Wang-tai (Bodai), situated in the eastern sector, from which the bay is commanded. The secondary objectives were the lunettes of Sui-chi-ying (Suisi) and the Kuropatkin Redoubt. The Russians retained all these positions, except the two fieldworks Pan-lung Shan (Banliusan), sited on the northern slope of Wang-tai. Except for this partial success the attack was a failure. Losses 16,000 men.

(*h*). 19th and 20th September. Second general attack. The principal objective was the capture of 203-Metre Hill and the neigh-

Digitized by Google

bouring works at Sui-chi-ying. The latter fell into the possession of the besiegers, but 203-Metre Hill continued in the hands of the Russians. Losses 6,000 men.

(*i*). 26th and 27th October. Third general attack. Its objectives were Wang-tai and 203-Metre Hill. A failure, losses 7,000 men.

(*j*). 26th November to 5th December. Fourth general attack directed against both the sectors of the defence. On the east no success, losses 7,000. On the west the Japanese captured 203-Metre Hill. Losses 7,500.

(*k*). 7th to 13th December. 203-Metre Hill served as an observatory for correcting the artillery fire of the besiegers, whose projectiles destroyed the Russian squadron in the Bay of Port Arthur.

(*l*). 18th December. The Japanese captured the permanent fort of Ki-ku Shan (Kitajodai). Losses 1,900 men.

(*m*). 28th December. Capture of Er-lung Shan (Niriusan). Losses 1,500.

(*n*). 31st December. Capture of Sung-chu Shan (Soyusan). Losses 350.

(*o*). 1st January. General Nogi's troops occupied Wang-tai. Losses 400.

General Stoessel proposed a capitulation, which was commenced on the 4th January.

It is proposed to deal very summarily with the engagements under (*e*) and (*f*) above and to consider (*g*) and (*h*) only in their relation to the Kuropatkin Redoubt.

Engagements of Ta-ku Shan, Siao-ku Shan and the Metre Hills.—As soon as the Japanese became masters of what we have called the Second Line, they commenced in the beginning of August to make the necessary preparations for undertaking the assault, but when they began to prepare their encampments, to arrange their communications and to site their artillery, they found that the Russians were observing their movements at close range from Ta-ku Shan and Siao-ku Shan, and were interfering with them by their fire; and in consequence they decided as a preliminary operation for the general attack to capture these two positions. This they succeeded in doing on the 7th and 9th August with a loss of 1,200 men. Ta-ku Shan was admirably suited for defence, all its slopes, except those on the south which were swept by fire from the work, were almost inaccessible. The Russians occupied it with two companies of infantry and eight field guns. Siao-ku Shan was held by one company. The Japanese attacked with 6 battalions, 36 mountain guns, and 12 9-c.m. mortars. The fire of a Russian flotilla on the 7th held back the enemy's advance; a similar result was achieved on the following day against a vigorous attack; but on the night of the 8th the assailants gained Siao-ku Shan, and as a result the Russians retired from Ta-ku Shan. The whole of the fortifications of the eastern sector were commanded from this hill, as well as the roads leading from the fortifications to the town and a great part of the bay. This was, no doubt, the reason why the Russian fleet left the port and engaged in the naval battle of the 10th August. The Russian vessels which returned to harbour after their defeat took care to alter their original moorings. Lieut.-Colonel Schwartz, in order to show the importance of Ta-ku Shan as an observatory for correcting the fire of the Japanese artillery, says that a 28-c.m. howitzer at its second discharge obtained the correct range of the artillery of the defence. Finally Ta-ku Shan in the hands

Digitized by Google

of the Japanese formed a traverse which defiladed the left flank of the attack from the view and fire of the defence.

Everybody knows to-day the extraordinary importance of Ta-ku Shan; but we can see from definite facts what was the opinion of the Russians. The war began on the 6th February, 1904, and four and a-half months later on the 19th June the defenders decided to occupy the position with two companies and a battery. As labour was scarce, and the rock very hard, the progress of the defensive works was very slow. The siege began on the 31st July. On the 2nd August it was decided that closed works should be constructed on Ta-ku Shan and Siao-ku Shan, and an engineer officer named Raskevski was ordered to take charge of them. On the 9th of the same month, after three days' hard fighting the attack gained both positions.

During the year 1897, when the present General Velisko was the commanding engineer, he reported that the security of the fortress required the construction of permanent works on Ta-ku Shan and Siao-ku Shan; but the question of finance came in the way and the report remained forgotten until the 19th June, 1904.

At the extreme right of the line the Japanese found that Takasakiyama (174-Metre Hill) exercised a similar effect on them to that which Ta-ku Shan did on the left, and they accordingly decided to seize it. This they succeeded in doing after three days' fighting with a loss of 1,500 men. The attacking force consisted of one brigade of infantry and 60 field guns. The fortifications of Takasakiyama were semi-permanent. The works constructed on the two hills (Namakoyama and Akasakayama) which lay between it and 203-Metre Hill were of the same nature.

General Velisko had also proposed in his report that the Metre Hills should be held by two permanent works.

First Attack on the Kuropatkin Redoubt.—On the 18th August, the Japanese were in full possession of the second defensive line of the Russians and of the advanced positions, which we have just described. The besieging army consisted of 48 battalions, 5 squadrons, 17 companies of engineers, 200 7·5-c.m. guns (72 mountain and the remainder field guns), 150 siege guns of from 9 to 15 c.m., and 24 machine guns. General Nogi, who was in command, gave orders for preparing for a general attack against the two sectors into which the Russian fortified line was divided by the River Lung. This attack was to be carried out in accordance with the principles laid down by Von Sauer, and had as its principal object the occupation of Wang-tai, from the heights of which the bay was dominated. The four lunettes, situated to the south of Sui-chi-ying and the Kuropatkin Redoubt formed the secondary objective. These last-named works formed together an advanced nucleus in the centre of the third defensive line.

At 11 a.m. on the 19th August fire was opened against the Kuropatkin Redoubt by six 12-c.m. howitzers and six 9-c.m. mortars: one hour later two field batteries (12 guns) and three mountain batteries (18 guns) came into action. At the proper time six field batteries directed their fire against the Sui-chi-ying Redoubts and the infantry approached the village of that name (destroyed by the Russians before they evacuated it) and certain undulations of the ground about 300 metres from the

Digitized by Google

redoubt. At 1 p.m. the Japanese, believing that the artillery preparation was sufficient, detached small groups of sappers who approached the wire entanglements of the Kuropatkin Redoubt and succeeded in opening some passages through it, by which the two companies who followed the sappers were to pass in open order and at the double. A few men reached the ditch, but the remainder of the assaulting force was detained by the entanglement and exposed to a heavy musketry fire which caused great losses.* A few minutes later two fresh companies advanced, but were unable to join the others, and found themselves obliged to throw themselves on the ground in order to get cover from the rifle fire from the work and also from the artillery fire from the inner line, which was both accurate and well timed. At 2 p.m. two more companies were sent to the assault, but did not succeed in covering 200 metres. In this situation the Russian artillery swept a wide zone occupied by the enemy, whilst the Japanese artillery had to cease firing so as not to cause loss to its own infantry. It is clear that under these conditions the attack could not progress. During the night of the 19th the Japanese repeated their attempts, but were repulsed. The searchlights and light balls which were skilfully handled by the Russians contributed to this result. As the same scenes were being enacted before the four redoubts, the Japanese withdrew their troops before daylight so as to leave the ground free for the artillery, which on the following day again bombarded the Russian fortifications. At 1 p.m. on the 20th an impetuous attack was ordered against the north and north-east fronts of the redoubt and against the lunettes. Each assaulting column consisted of nine companies, and the advance was simultaneous. The column directed against the redoubt succeeded in penetrating into the ditch of the north front, but at 3 p.m. an opportune Russian counter-attack put it to precipitate flight.† The troops of General Nogi suffered 2,500 casualties during the 19th and 20th August in these unsuccessful attacks against the Kuropatkin Redoubt.

On the following morning the Russians found themselves in full possession of the redoubt, and had repaired the parapet during the night. The Japanese occupied (*Plate* V.) trench X, 180 metres long, which they could enter in safety from the rear.

Second Attack and Capture of the Kuropatkin Redoubt.—The enormous losses suffered by the besiegers (16,000 men) in their first general attack, conducted on Von Sauer's principles, from the 19th to the 25th August, made them see their error and abandon this rapid method of capturing fortresses, which never leads to good results. In consequence General Nogi decided to revert to the classical methods of siege warfare, and accordingly works were begun at six points, one of which was trench X (*Plate* V.) which, with modifications in its profile, was extended to right and left so as to convert it into a first parallel against the Kuropatkin Redoubt. On the night of the 31st August approaches were started from point X in the form shown in *Plate* V. The third parallel, 60 metres from the glacis, was finished on the 15th September. This work presented two peculiarities of importance, the one being the

* Capt. Yate of the English Army who was attached to the army of General Nogi says in an official report that the leading company attacked with 180 men of whom it lost 150.

† According to Capt. Yate a part of the troops abandoned their arms in the flight.

Digitized by Google

substitution of zigzags for the straight trench with traverses and blinded cover which joined the first and second parallels; the other, the employment of a great number of sandbags, so that the whole supply in the depôt at Dalni was soon expended, and more had to be made from pieces of coloured calico which were there. The Russians did not interfere with the Japanese sappers to any extent.

Simultaneously with these works, others were begun against the four lunettes and were completed on the 18th September. The assaults on these works were made simultaneously with that against the redoubt, but were to a certain extent independent of one another. The former were carried out by the left brigade of the 1st Division and the latter by the right brigade of the 9th Division.

At 1 p.m. on the 19th September fire was opened against the redoubt by the same pieces as in the earlier attack. Whilst the siege guns were bombarding the shelters and the parapet, the field guns enfiladed front 1—2 and the trenches on the east of the work. Two hours after the commencement of the cannonade all the head cover, formed of sandbags, seemed to have been destroyed, the earth forming parapet 1—2 had fallen into the ditch to a great extent, and signs were to be seen of some shelters having fallen in.

At 5 p.m. the assaulting column of 400 men began to move in the first parallel, and before 6 o'clock it threw itself into the ditch in front of face 1—2 without suffering serious loss except in the 60 metres which separated the third parallel from the redoubt. At the right moment the Japanese made an offensive demonstration from the eastern end of the first parallel against the small redoubt near the railway, and thus distracted the attention and fire of its defenders at the precise moment of the assault. Once in the ditch 1—2, the flanking fire prevented the attackers from rushing round to the gorge, and although the breach opened by the artillery in parapet 1—2 was practicable, they could only move through it on a front of two or three men and these fell sacrificed before reaching half-way on their journey. In this situation the hand grenades of the defence contributed in forcing the greater part of the assaulting column to retreat to their trenches at 6.30 p.m., after having suffered severe loss. At nightfall a few men remained in the ditch who kept waving a small Japanese flag above the crest of the glacis. When the assault began the Japanese siege artillery ceased firing and the field guns directed their fire against the gorge. The help given by the artillery to the attack was very effective and opportune. The guns placed in the forts of the Russian line, especially those of Wang-tai, assisted the defence with an accurate and active fire.

The Japanese made use of the darkness to repeat their attacks, always in the same manner. Finally at 2 a.m. on the 20th they succeeded in dislodging the brave defenders from their works.

The losses suffered by the attack were 1,200.*

The immediate benefits gained by the Japanese by the capture of the Kuropatkin Redoubt were that they cut the water supply of Port Arthur and were able to begin sapping against the forts of Er-lung Shan.

* The different authors who have been consulted are not in accord as to this number.

Digitized by Google

Conclusions.

(A). On studying the invasion of Manchuria by the Japanese armies under Marshal Oyama, it will be seen that, both in the battles fought separately by the 1st, 2nd and 4th Armies and in those in which the 3rd and 5th Armies took part, the most vigorous attacks and defences, the most bloody encounters, and the moments in which the belligerents suffered the greatest losses were those in which they were struggling for the possession of some hill or elevation of the ground. This was the case in the Kuan-tung Peninsula, first at Nan Shan, afterwards at Ken Shan and the First and Second Lines, later on the northern spurs of the Metre Hills and Ta-ku Shan, and lastly at Wang-tai and 203-Metre Hill, all of which actions show the importance attributed by both combatants to the possession of the hills. Exaggerating the form of expressing this idea, we may say that the Russians and Japanese during the recent war were obsessed by heights; and it is logical to suppose that they had good reason for so being.

General Nogi directed his efforts from the beginning against Wang-tai and 203-Metre Hill, and their possession was the object of a series of sanguinary combats during the Siege of Port Arthur. When the illustrious Russian General Kondratenko, on the 5th December, a few days before his death, saw the Japanese flag waving over 203-Metre Hill he exclaimed "This is the beginning of the end"; and hardly had Wang-tai fallen into the hands of the Japanese than General Stoessel hastened to propose a capitulation. These two heights were the keys of the fortress, but in addition these two and Ta-ku Shan were the three best observatories which the attacking artillery could have for correcting the fire of their guns, and, amongst other things, for sinking the remains of the Russian Pacific Squadron, which was anchored in Port Arthur. Under these conditions it does not seem amiss to consider that if one of General Nogi's principal objectives was the possession of observatories for his artillery, nothing could have been more suitable for gaining this end than the employment of captive balloons, which might perhaps have prevented a good many of the innumerable losses suffered by his troops. Definite data are wanting regarding the form and circumstances under which the Japanese aerostatic service was working, and accordingly it would be rash to attribute to the deficiencies of the Service that which should be attributed to the difficulties imposed by the ground. The facts are that the besiegers did not obtain help of any importance from balloons, and that the besieged lamented their want of them, for according to Von Schwartz they would have lent great assistance in discovering the position of the enemy's batteries.

(B). The fortifications of Ta-ku Shan, to the east of Port Arthur; of the Metre Hills to the west, and the Kuropatkin Redoubt on the north should be considered as three advanced positions in the line of Russian forts. The number of casualties suffered by the attacking troops in capturing these three nuclei amounted to 20,000 men; and this figure, without taking account of other factors, is sufficient in itself to make it understood that these positions complied with their mission of permitting the besieged to dispute the ground foot by foot. On the other side the

Digitized by Google

partizans of advanced positions will be able to strengthen their arguments in favour of them by putting forward this recent example and enumerating the services rendered to the defence by Ta-ku Shan, the Metre Hills and the Kuropatkin Redoubt, in spite of the deficient state of their fortifications. The Japanese confess that if 203-Metre Hill had been crowned, as General Velisko proposed, by a permanent fort, they would never have been able to capture it. Finally it should be observed that the central advanced position, namely the Kuropatkin Redoubt and the Sui-chi-ying Lunettes should have been sited further to the north, at Fen-huang Shan. The spurs of this mountain were chosen by the Japanese for the emplacements of their siege artillery, parks, hospitals, etc., under cover from view and fire from the Russian line.

(C). The points chosen by the Russians for siting their fortifications round Port Arthur have given rise to various critical opinions, but in general terms they coincide in recognizing that the line of forts was too close to the town. Within the limits of our study we cannot comment on this, and will only allow ourselves to copy the following words of General Nogi:—The lessons learnt during the siege show that a town or bay cannot be protected by a ring of fortifications constructed close to it. Such a ring can only preserve it from destruction if the forts are situated at a distance of 12 k.m. (7½ miles) from the important points which it is desired to cover. To-day forts placed 8 k.m. (5 miles) away are useless. A fortified bay or town without exterior forts placed as above indicated is simply a costly depository for the enemy's projectiles.

(D). Both in the position of Nan Shan and in the siting and nature of the forts round Port Arthur, the superior Russian authorities, for unknown reasons, omitted to take technical advice, and later experience has shown that if they had done so the defence of the place would have been greatly prolonged.

FINAL.

The Russian troops who survived the siege became the prisoners of the Japanese and on returning to their own country had to support the accusations of public opinion. The celebrated trial and condemnation of General Stoessel contributed without doubt to the idea that the defence of Port Arthur was not as energetic as it should have been. Almost all its defenders were overwhelmed with censure. Although we are wanting in authority and in authentic data for reconstituting the truth of what occurred, we will permit ourselves to conclude this study by repeating the names of the following corps and of two Generals who took a very active part in the engagements:—

The 5th Siberian Rifle Regiment was sacrificed at Nan Shan, and later covered itself with laurels at 203-Metre Hill.

General Kondratenko was, as is known, the soul of the defence.

General Tretiakov, a former engineer officer of Plevna, was the colonel of the heroic 5th Siberian Rifle Regiment.*

'M.'

* See *The Royal Engineers Journal*, 1909-10, article entitled "The Final Struggle for 203-Metre Hill at Port Arthur."

Digitized by Google

REVIEW.

THE CONSTRUCTION OF A HOUSE.

By CHARLES GOURLAY, A.R.I.B.A.—(13″ × 10″. Price, 6s. 6d. bound, or 6s. in portfolio. B. T. Batsford, 94, High Holborn, W.C.).

THIS book illustrates to a remarkable degree the immense advance made within recent years in the production at a moderate price of books on Architecture and Building Construction.

Printed on excellent paper and well bound the book contains 40 clear and carefully detailed plates showing a site plan, plans of three floors, sections, and elevations of a typical country house with full details of the construction and internal finish. The drawings are in good architectural style and are also explained by 22 pages of letterpress.

The site plan shows the arrangement of the grounds and outbuildings, and the scheme for drainage: a design for the motor house and chauffeur's lodge are also given.

The constructional details given are of general application, and the book is one that would be useful for reference in a R.E. Office when designing work is being done.

BOOKS RECEIVED.

EXPANDED STEEL FOR REINFORCED CONCRETE CONSTRUCTION. The Expanded Metal Co., Ltd., York Mansion, York Street, Westminster, S.W.

SEWAGE DISPOSAL WORKS. THEIR DESIGN AND CONSTRUCTION. By W. C. Easdale, M.S.E., M.R. SAN. I. 10s. 6d. E. & F. N. Spon, 57, Haymarket, W.

LA MITRAILLEUSE AIRATRICE. By Capitaine D'Andre. 4 francs. R. Chapelot et Cie., 30, Rue et Passage Dauphine, Paris.

L'AÉROPLANE ÉTUDIÉ ET CALCULÉ PAR LES MATHÉMATIQUES ÉLÉMENTAIRES. By Capitaine du Génie Duchêne. 5 francs. R. Chapelot et Cie., 30, Rue et Passage Dauphine.

Digitized by Google

NOTICE OF MAGAZINE.

REVUE MILITAIRE DES ARMÉES ÉTRANGÈRES.

June, 1910.

MILITARY NEWS OF DIVERS COUNTRIES.—*Austria.*—The Army Motor Car Department is divided into three sections:—(1). The experimental section, consisting of a field officer, two subalterns, and a retired subaltern and two N.C.O.'s for records. (2). The "cadre" of motorists, consisting of the permanent staff, and a number of drivers varying with the number of cars in use. (3). The officers attached to the district commanders, *i.e.* staff officers. The duties of the experimental section are:—(*a*). To study the technical development of the motor car industry. (*b*). To edit all technical discussions, regulations, and training manuals. (*c*). All arrangements connected with the ordering of new cars, all trials and experiments. (*d*). The compilation of statistics concerning all service and private cars. (*e*). To study the motor car organization employed in foreign armies. The "cadre" of motorists includes the headquarters of the motor car department, the instructional establishment, and the park and workshops. To the headquarters of each territorial district, an officer is attached as technical adviser in all matters concerning automobilism. The motor car department is entirely separate from the corps of motor-cyclist volunteers.

It is proposed after this year to form permanent companies of cyclists consisting of a captain or senior subaltern as commander, 2 officers (4 in war), 30 men per section, a medical orderly, a mechanic, and 4 chauffeurs. A motor cycle capable of carrying 300 kilos. and a tricycle are allotted to every 30 men, and 2 motor cars and 2 light vans to each company.

A course of aeronautics for 11 military and 2 naval officers has been going on at Vienna since the 1st May and will last till the 30th September.

Germany.—Courses for the instruction on the care of arms, bicycles and range-finders, consisting of about 20 subalterns of all arms of the service, each lasting about three weeks, have been established in various towns at different times of the year.

An infantry subaltern is to be attached each year for one year to each railway regiment, and in the same way each telegraph battalion will have attached to it 2 infantry subalterns and 3 subalterns of the cavalry or field artillery. Conversely, each railway regiment will send a subaltern for one year to the infantry, and each telegraph battalion will send a subaltern to the cavalry or field artillery. The officers selected must not have less than 3 or more than 11 years' service.

Digitized by Google

Spain.—The Corps of Occupation at Mellilla has been placed under the command of a lieutenant-general, with a major-general on the staff to assist him. Its composition is as follows:—4 infantry regiments, *i.e.* 36 battalions of 6 companies each; 3 rifle battalions each of 6 companies, commanded as one regiment by a colonel; 2 machine gun detachments of 4 guns; 1 cavalry regiment of 6 squadrons; 1 brigade of field artillery (3 batteries); 1 brigade of mountain artillery (3 batteries); artillery headquarters; 1 battery of mountain artillery; 1 howitzer battery; 1 ammunition park; 1 mixed regiment and 1 mixed company of engineers; 1 section of administrative troops; 1 mixed company of medical troops; 1 company of sailors. In addition to this there are native troops and the disciplinary brigade; the total strength of the command is 20,000 men.

United States of America.—The United States Army is to be reorganized, and the whole country has been divided into 8 army corps districts. The first army corps, consisting of 3 divisions with headquarters at New York has alone so far been organized. The organization of the divisions is as follows:—Each division is composed of 3 brigades of 3 infantry regiments each, of 1 regiment of field artillery (6 batteries), of a battalion of engineers, of 2 companies of the signal corps, and of medical troops. To each division is also attached a cavalry regiment of 12 squadrons.

July, 1910.

Military News of Foreign Countries.—*Germany.*—A long article is devoted to the "Rang-Liste" and "Dien-alter-liste" of the German, from which the following points have been noted:—(1). The proportion of officers of the middle classes to those of noble birth is gradually increasing in the so-called "aristocratic regiments" such as the Guards and certain cavalry regiments. (2). The periods during which officers retain one rank before promotion is approximately:—Subaltern, 17 years: captain, 12 years: major, 7 years: lieutenant-colonel, 3 years: colonel, 4 years: G.O.C. brigade, 3 years: G.O.C. division, 4 years.

The senior captain of the Prussian Army has held a commission since February, 1884. On the staff, however, several majors have commissions dating only since 1890: this is due to two facts:—(1). The staff officers are sent to corps where there are relatively few senior captains and thus rapidly attain that rank. (2). Staff captains compete only amongst themselves for field rank, and have their own roster above the rank of major. (3). Military rank has just been conferred on the officials of the veterinary department.

The artillery now possesses 1 observation wagon per battery, and 1 per brigade of artillery. These wagons do not appear on parade. In peace they are drawn by 4 horses, but as in war ammunition will be carried in the limbers which are to be 6-horsed. On the line of march the observation of fire instruments are carried in the wagon, but in action the directors and battery telescopes are taken away and carried by the mounted men of the B.C.'s party. The wagon has a shield fixed on to it, and so have the ladder and seat on top of it from which observations are made. In the heavy artillery, the observation wagon travels in front of

Digitized by Google

the guns, and thus is in a position to trot on ahead and get into position before the guns, which can thus open fire immediately on arrival.

Switzerland.—In view of the fact that any future campaigns will involve a large number of night operations, the school of recruits at Berne has been making experiments in night firing. Three methods were employed :—(1). Placing the rifles in position during the daytime on rests. (2). Using an intermediary target placed 500 metres away from the firer in such a position that all shots on it must also infallibly fall on the main target. This intermediate target consisted of a white canvas. (3). Illumination of the target, either by hand grenades, star shell, electric projectors, or by a fire lit at some distance away from the target so as to light it up. The results of the three methods were as follows :—Method 1.—This was very efficient; of 398 shots fired against 33 dummies, at a range of 350 metres, 228 hits were registered, and at 430 metres out of 436 shots fired 250 hits were scored on 45 dummies. Method 2.—This was the least successful method; at 150 metres, out of 407 rounds fired by 34 men, there were only 11 hits, 9 dummies only being touched. Method 3.—This was the most effective of the three methods especially at ranges allowing of the use of hand grenades. Ten series were fired in all at ranges varying from 40 to 400 metres against dummies representing men kneeling.

A. H. SCOTT.

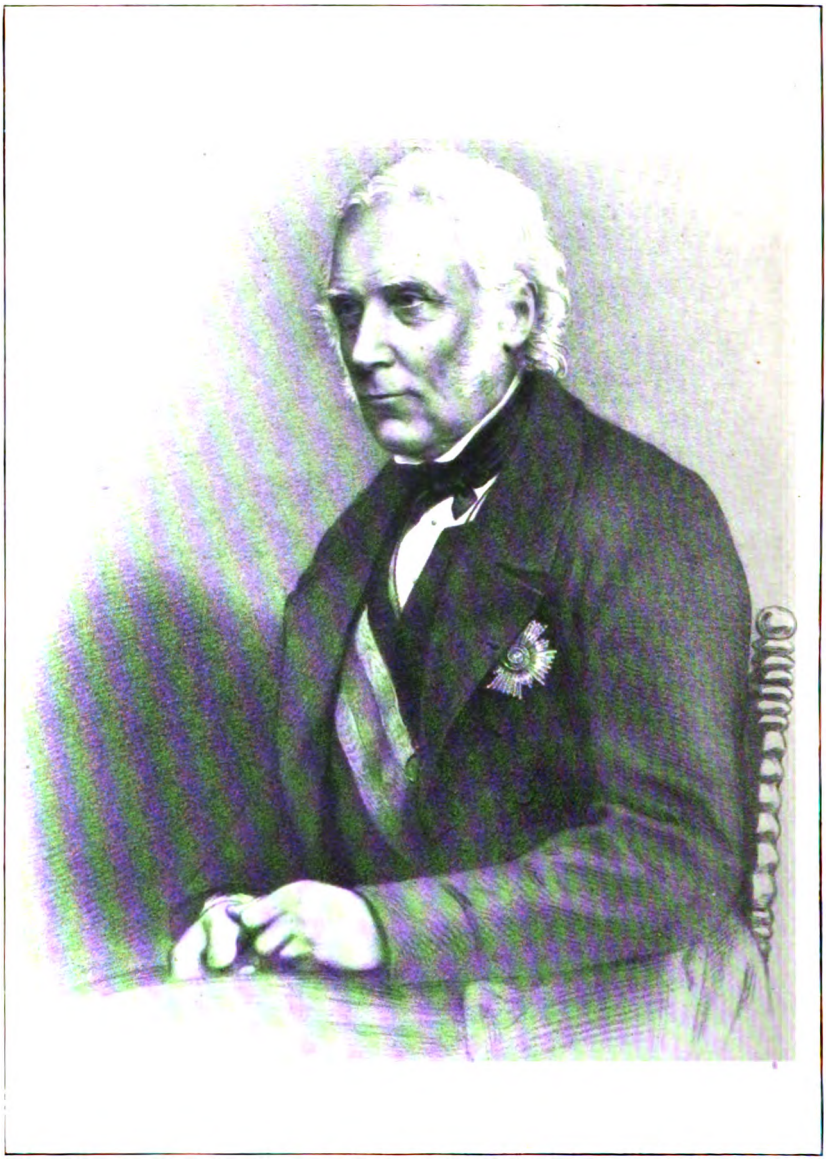
Digitized by Google

A. SCANDELLA.—THE FORTIFIED POSITION OF NAN SHAN AND THE KUROPATKIN REDOUBT.

Digitized by Google

Digitized by Google

Digitized by Google



Major-General Sir William Reid, G.C.M.G., K.C.B., F.R.S., R.E.

Digitized by Google

THE MILITARY USES OF THE AEROSTAT.

By Capt. P. W. L. Broke-Smith, R.E.

The following consideration of the military uses of the aerostat is published in the hope that it may be of general interest. It was, however, originally written some months ago, and events develop very rapidly in the aeronautical world, hence it is not claimed that the study is up to date in every particular.

In preparing the study recourse has been had to an article which appeared in the *Bulletin de la Presse et de la Bibliographie Militaire.*

Portions of the notes are based on articles which were published in the *Streffleurs Militärische Zeitschrift* and the *Gazette de Cologne.*

The opinions expressed may, therefore, be generally considered to be in agreement with the accepted ideas of at any rate one school of thought in both France and Germany.

Since the recent attainment of success in the dirigibility of aerostats, a number of writers on military subjects have put forward, in their enthusiasm, what may be described as rather exaggerated expectations as to the effect of the command of the air on the conduct of war. Practical experience and a deeper study of the question must, however, give birth to more considered ideas.

By the side of the incontestable advantages of dirigible balloons, it must be recognized that there exist also inconveniences, and that the service of strategic reconnaissance, the most important service of airships in war, will not be effected without difficulties. Already all the most important firms who are engaged in the manufacture of artillery have bethought themselves of field pieces, carried on automobiles, capable of firing shrapnel and suitable shells which will keep dirigibles at a respectful distance.

Besides, there are the elements against which they must fight :— the wind, the storm and the fog.

The object of this study is to bring into focus, ideas as to the value of the dirigible aerostat as an engine of war.

The Dirigible Balloon.

The possibility of travelling through the air in a dirigible balloon, at a great height and in a freely chosen direction, has given rise to the idea that one could launch from the altitude of these aerostats

Digitized by Google

immense quantities of explosives, sow terror and disaster in the ranks of the enemy, rapidly transform modern armoured works into heaps of ruins, or send the most powerful Dreadnoughts to the bottom of the sea in a few instants.

In reality, far less must be expected.

A medium-sized military dirigible has a capacity of about 85,000 cubic feet. This capacity would appear considerable if we consider that in order to permanently shelter the Austrian airship, which is of this size, a shed is required which has cost nearly a quarter of a million crowns, to which expenditure must be added the cost of the manufacture of the gas necessary to maintain the balloon well inflated.

On the other hand, this capacity is small if we consider that such a dirigible cannot carry much beyond the *personnel* necessary for its management and for reconnoitring work, and indispensable ballast.

If it were desired to provide such a balloon with an installation of wireless telegraphy, to make it capable of carrying a certain quantity of explosives, and to furnish it with motors sufficiently powerful to allow it a very rapid rate of advance, its volume would have to be considerably increased. Such dimensions would result that the balloon would be visible at distances up to over 15 miles in clear weather. Once discovered, such a balloon would become, to the great danger of its passengers, the object of the constant attention of the artillery officers, who would not neglect to open fire as soon as the balloon arrived within range of their guns, viz. about 5 miles.

The balloon would then have to advance for from 8 to 10 minutes after coming within range, before aiming at the point which it wished to attack.

As a quick-firer can discharge 8 to 10 shots a minute (with a well-trained *personnel* it is stated that a rate of 10 shots in 24 seconds can be attained), and as the artillery of neighbouring works, intermediate batteries, etc., would intervene equally in the fight, the balloon would need enormous luck to be able to pass through this hail of projectiles without being damaged.

If, however, it could manage to reach the target keeping at an altitude of over 6,000′ its crew would have to decide the precise moment at which to launch the explosives.

When an object is dropped from a height of 6,000′ it takes, without considering the resistance of the air, about 20 seconds to reach the ground. But the balloon has acquired a velocity of its own—40′ per second, or over 25 miles per hour for example. This velocity is equally possessed by the object launched from the balloon.

Consequently, the bomb will in its fall describe not a straight line but a curve. In the example given during a fall of 20 seconds it will travel about $40 \times 20 = 800'$ horizontally.

Digitized by Google

It will, then, be necessary for the explosives to be launched before the balloon passes over the target, and to determine the moment of discharge it will be necessary to calculate each time the exact height of the balloon, its speed, the influence of the resistance of the air and of the independent velocity and direction of the wind, etc.

Suitable tables and diagrams to suit various conditions of height, speed, independent wind velocity and direction, etc., will have to be prepared beforehand and carried on board the airship, in order that with their aid it may be possible to determine the distance in front of the target at which the bomb should be discharged. It appears, however, that the determination of this point can never be made anything in the nature of an exact science, and all will depend on the last resort on the individual personal instinctive skill of the man discharging the bomb and of the man in charge of the airship. It is of course possible to imagine that the bomb may be discharged in some manner from the airship so as to give it an initial downward velocity. This will straighten out the path of the bomb through the air and will reduce the initial horizontal distance which must be allowed. The muzzle of the discharging apparatus might even be pointed to the rear to a certain degree according to the velocity of the airship, the direction and independent velocity of the wind, etc., and the bomb could then be discharged at the moment of passing over the target.

Unless the airship be of very large dimensions it would appear that the comparatively severe shock attendant upon the discharge of a projectile at a high velocity would be extremely undesirable. This shock would tend to disturb the equilibrium of the airship, even though the actual balance would remain unaffected owing to the discharging apparatus being fixed at a suitable point with respect to the centre of mass and centre of stability.

The sudden loss of a comparatively large amount of ballast by the discharge of a mass of explosive will also upset the equilibrium of the balloon, and necessitate discharge of gas and the balloon rising to and attaining equilibrium at a higher level on every occasion on which a large weight of explosives is discharged. The sudden tendency to rise can of course be counterbalanced by the manipulation of altitude rudders, provided that the airship has a sufficiently high speed of advance with respect to the surrounding air.

It would, therefore, appear that the explosives should be discharged when the airship is moving against the wind, as then its velocity relative to the surrounding air will be comparatively high, giving the rudders a maximum effect, and its actual speed of translation relative to the earth will be comparatively low.

Unless the initial downward velocity of the bomb be great compared with the velocity of the wind, consideration will have to be

Digitized by Google

given to the direction of the wind in approaching the target. It will probably be essential to discharge it when the airship is moving directly up or down wind towards the target.

It must also be borne in mind that the direction and strength of the wind currents frequently vary considerably at different altitudes, and it can be conceived that in passing through a vertical distance of over 6,000′ the projectile will meet in its course wind currents entirely different in strength and in direction to those prevailing at the altitude at which it was discharged. If these currents are unknown or have not been taken into consideration, and the current at the altitude of discharge only has been considered in working out the point of discharge, it is obvious that unless the initial velocity of the projectile is comparatively great, or the weight of the projectile is comparatively large in proportion to its volume, it will be diverted from its intended course and will strike wide of the mark.

Diversity in the strength and direction of wind currents is, in particular, experienced over large collections of buildings; and the conformation of the ground at all times causes the wind currents at low altitudes to have a tendency to vary in strength and direction from the currents at greater altitudes, which are not so much affected by the contour of the earth beneath.

The relatively small and well-protected modern works would seem to have little to fear from the dirigible balloon, provided that they are furnished with the armament necessary to combat it. However that may be, as soon as it has launched its charge the balloon will have to effect its return through the cloud of projectiles which has been described above.

The attacker will, then, think twice before exposing to the danger of destruction so costly an apparatus, which is irreplaceable during the course of the war, and will hesitate to do so in order to discharge some 7 lbs. of dynamite without certainty of success.

It would be more advantageous to profit by the extreme power of mobility of a dirigible balloon, and to provide it with a wireless telegraphy installation and endow it with powerful motors giving it very great speed.

Thanks to its large radius of action the dirigible balloon would then be eminently adapted to reconnaissance in the widest sense of the word.

It would serve in the first place for strategic reconnaissances undertaken to report the presence or otherwise of the enemy in force within a particular area, as well as the general distribution of his troops. The value of such information would be naturally increased if it reached headquarters through the medium of wireless telegraphy.

Employed with circumspection and skill the dirigible balloon will render very appreciable service.

Digitized by Google

In the case of a medium-sized non-rigid balloon such as that mentioned, of capacity about 85,000 cubic feet, a shed can on occasion be dispensed with, if necessary, since the deflated balloon, with all its accessories, can be carried on wagons, and follow the army.

For this purpose about 25 four-horse vehicles are required for such a balloon. The quantity of gas thus carried is only sufficient for a single inflation. For every additional inflation about 20 four-horse vehicles would be required, as refills are necessary. As it is equally imperative to provide for the maintenance of the *personnel* and horses, the aerostatic train of an army in the field will reach a very considerable development, and provision for it will have to be made when calculating the mechanical transport requirements of the army.

Small calibre quick-firing guns, constructed so that the muzzle can be pointed up at large angles of elevation, are the most suitable to combat dirigible aerostats.

At a distance of 3 miles and at an altitude of not more than 2,500′, the dirigible balloon can theoretically be cannonaded by the latest field guns. As a matter of fact effective fire at greater distances and at greater elevations is also theoretically possible ; but it is then necessary for the trail to be buried in the ground, since the elevating mechanism can no longer give the necessary elevation. If this cannot be done recourse must be had to the howitzer.

The Aeroplane.

In consequence of the important results achieved in the course of one year it may be affirmed that the future belongs to the aeroplane. At the present moment, it must be admitted, it is not sufficiently perfected to be fit for adoption as a regular instrument of war. Above all the construction of a suitable motor is imperative. The motor must be sufficiently light, whilst also being able to run with certainty for several hours, and it must be capable of endowing the aeroplane with a high speed, which will, of course, increase its carrying power.

The aeroplane must be able to raise itself in the air, starting from any point. A greater measure of stability, and, if possible, automatic stability is equally desirable, all the more so in that it would not only guarantee security in flight, but would also make learning to fly easier and shorten the period of tutelage.

An aeroplane which is to be used for military purposes must be able to carry a light load, and the dismantling and the erection of the machine must occupy but a short space of time.

Supposing that all these perfections can be applied to aeroplanes, one of the greatest advantages of these engines of war over dirigible

Digitized by Google

balloons will be that at a distance of about 3 miles they are scarcely visible.

Those who saw the flights of Drexel, Morane, Grahame White and Jones from Bournemouth to the Needles this summer can testify that it was difficult to discover the aeroplane even by means of the telescope when it could not have been more than 3 miles distant, and at 2 miles it was practically invisible to the naked eye unless the direction were actually known.

An aviator who succeeded in approaching within 2 miles of the object to be observed without being perceived himself, would see much without running any risk. This is one of the most valuable qualities of the aeroplane from the military point of view.

Up to the present the observations made by means of the aeroplane must be reported by the aviator himself. It follows that it will not be used in the manner of the dirigible balloon for flights of long duration over large areas, but rather to make relatively short dashes, unless by reason of improvements introduced in the motor it may be possible to provide the aeroplane with a wireless telegraphic installation. This is said not to be impracticable, for every time that the power of the motor is increased by one horse-power the carrying power of the apparatus is increased by about 40 lbs.

The sphere of military utility of flying machines varies with the state of the atmosphere, the length of time the motor will run, and the proper speed of the machine.

With regard to atmospheric conditions the aeroplane is better situated than the dirigible balloon, since the resistance which it normally encounters is much smaller.

A contrary wind of 22′ per second (15 miles per hour) facilitates the start as well as the landing.

In October, 1909, at Blackpool, Latham made a flight of about 30 miles in a wind of 53′ per second (about 36 miles per hour).

It has been reported that at the Wright's flying school in America flights are made by the pupils in winds of over 40 miles per hour.

The length of time that the motor will run vitally affects the machine. The greatest time for which a present-day aeroplane can be relied upon to fly is six hours. The speed attainable at present is about 60 miles per hour. It does not seem impossible that a velocity of 90 miles per hour may be reached before very long.

If the present-day maximum achievements of aeroplanes can be considered as *normal* achievements, there is reason to be satisfied from a military point of view. For with a velocity of 45 miles per hour (66′ per second) and a length of run of $4\frac{1}{2}$ hours, an aeroplane could carry out a journey of about 200 miles. It would then have a radius of action of 100 miles.

Digitized by Google

From these figures it is seen that aeroplanes will be above all practicable machines for relatively short reconnaissance flights, on condition that an observer is carried besides the driver.

In siege warfare, in the attack of strong places and of fortified points, aeroplanes might already in their present state of development render much service.

For field or mobile warfare it will doubtless be necessary to await the improvements detailed above before they can be considered to be practical instruments of war.

The valuable quality of the aeroplane of allowing observations to be made without being itself perceived, predestines it for the service of reconnaissance, since it can approach without risk within 2½ miles of the object to be observed, and even closer by running risks which are relatively small. During this time the aeroplane must remain constantly in rapid motion, and in order that the utmost use may be made of it as an instrument of war, observations of comparatively minute details must be effected at a distance of 2 miles.

During the advance, by means of repeated flights, reports can be furnished within a few hours if during the course of the day contact is gained with the enemy.

These reports can supply valuable data on which the measures to be taken for reconnaissance and for protection can be based. Information received by the Commander-in-Chief from other sources can be checked by special aerial rapid reconnaissances or dashes, which considering the enormous speed of aeroplanes would not require much time for execution.

When water is encountered across the line of advance the dirigible aerostat can render the most signal services; in front of a line of water which it is difficult to cross, every other means of reconnaissance would be temporarily useless.

In the battle itself aeroplanes can approach closer to the enemy's lines than dirigible balloons and so can render greater service, and both types would obviously be specially useful to look out for turning movements against the flanks, the aeroplane's special *rôle* being to make repeated sudden reconnaissance dashes.

It is interesting to consider the altitude which an aeroplane must be able to reach in order to be useful for military purposes.

2,500 to 3,000′ has been laid down as the minimum height. It is only at this altitude that the aeroplane is safe from the musketry fire of the enemy.

This height is sufficient when the machine is vertically over a party of riflemen. If it does not approach closer than within 1½ miles of riflemen it will be scarcely visible and will be still less likely to serve as a target for effective fire.

If we do not take the question of vulnerability into consideration,

Digitized by Google

the aeroplane must be able to cross all the objects to be met with on the terrain to be traversed, such as houses, woods, etc., as well as elevations in the ground.

For this it is sufficient for it to maintain a height of from 1,500 to 3,000′.

Heights of over 9,000′ have been attained recently.

Just as the telephone and the telegraph therefore have never pretended to entirely supplant the primitive methods of ground reconnoitring and reporting, so the results obtained by aeronautics must only be considered as a very valuable new development of the means which the military commander utilizes in order to accomplish his most difficult task, viz. the direction of large armies.

Digitized by Google

A FIELD PRACTICE SUB-TARGET.

By Capt. F. V. Thompson, R.E.

The chief impression left on the mind by a useful and interesting course of instruction at the School of Musketry, Hythe, was the comparative ease with which men can be instructed in classification firing and the difficulties experienced in devising efficient instruction in collective firing, owing to the lack of field practice ranges in this country.

The necessity for this instruction is at once obvious when it is realized that on service, the men in the firing line seldom see the target they hope to hit. A prone khaki figure is invisible at 600 yards and often at 200 or 300 yards.

Consequently a high standard of training in controlled and directed fire is essential if any effective volume of fire is to be produced at a target invisible to the firers.

The necessary training may be subdivided as follows :—

Fire Unit Commanders	1. Detection of enemy. 2. Description of target (with reference to natural objects). 3. Estimation of range. 4. Control of fire.
Firers ...	5. Recognition of target. 6. Adjustment of sights. 7. Accuracy and rate of fire. 8. Fire discipline.

The 30 yards or miniature range and landscape target are at present the chief means utilized for the preliminary training. The conditions are necessarily artificial and restricted. Estimation of range is practised separately, which prevents the effect of faulty estimation being efficiently demonstrated.

With a view to making a nearer approach to service conditions and affording practice more closely resembling that obtainable on a field practice range, a simple form of sub-target has been devised which affords instruction in all the subheads mentioned above in such a way that the order of realism, compared with existing methods of instruction, is reversed.

For instance, on the 30 yards range the realistic portion of the practice is the actual firing of the rifle, the shock and noise of

Digitized by Google

discharge, whilst the artificial portion is the detection of enemy, description of target, estimation of range and recognition of target—a scenic target is used for the purpose.

With the Field Practice Sub-Target the order of realism is reversed. Fire can be directed and controlled over a large sector of actual country at any range (which must be correctly estimated). Fatigue men firing blank can be used for practising detection. On the other hand there is no actual firing of the rifle and the record of hits is on the sub-target.

This order of realism would seem to be more logical as men would not be exercised in field firing until thoroughly trained in classification work and would be well acquainted with the shock of discharge, etc., whilst their lack of experience would be chiefly in collective fire at a natural target.

There are obviously increased facilities in the training of fire unit commanders.

The Field Practice Sub-Target will afford some of the advantages of a field practice range at little or no cost in the matter of ground, but it is hardly necessary to point out that no makeshifts such as 30-yard ranges, miniature ranges, landscape targets and sub-targets however cheap or efficient can be advocated as substitutes for field practice ranges so long as there is land available in this country and money to buy it. They may however form useful aids to instruction in preparing men for field firing and tend to economy in time and ammunition. In cases where field firing has to be carried out on a classification range the Field Practice Sub-Target should help to supplement the training.

There are several forms of sub-target on the market but so far as is known all are confined to classification firing under conditions which are entirely artificial.

Although not essential, it was decided, in order to simplify construction and lessen cost, to pivot the rifle by a ball and socket joint.

A number of experiments were made to determine the "point of least constraint."

This point is found to be 3″ in advance of and 3″ below the toe of the butt when the rifle is in a horizontal position. The feeling of constraint to a firer in the prone position, when the rifle is fixed to an upright standard by a good ball and socket joint at this point is almost inappreciable, provided the height is adjusted to the individual. Lowering or raising the rifle 1″ from the normal position is found to be sufficient compensation for difference in build of firers and is most conveniently effected by having two mats each 1″ thick which can be placed under the firer's elbows as required. A more efficient but more cumbersome method is to place the firer on a 6′ wood platform which can be raised at its front edge as required.

Digitized by Google

A joint at the point mentioned allows the reproduction on the sub-target of the common errors such as "bobbing," flinching, pulling at the trigger, and inclination of sights (except at short range).

For elementary instruction the joint would be an objection and a free rifle preferable, but as only trained shots would use the sub-target there appears to be no objection to a "tied rifle" provided the results of firing correspond to field firing results and the firer's position and "feel" of the rifle are normal.

The results of firing at prone figures at ranges from 500 to 2,000 yards have been tested and found to agree approximately in percentage of hits with actual field firing results. A prolonged series of tests would be necessary to finally settle this point.

Firers are so far agreed that their position and "feel" of the rifle are normal and that they are in no way "baulked" by the joint when the elbow rest is properly adjusted.

The following is a brief description of the device :—

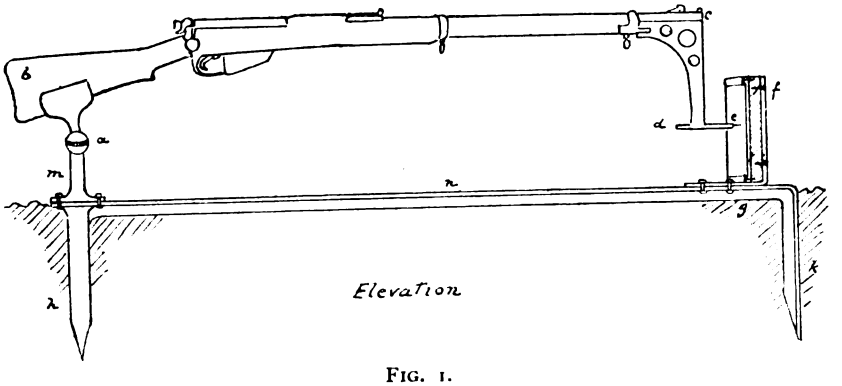


FIG. 1.

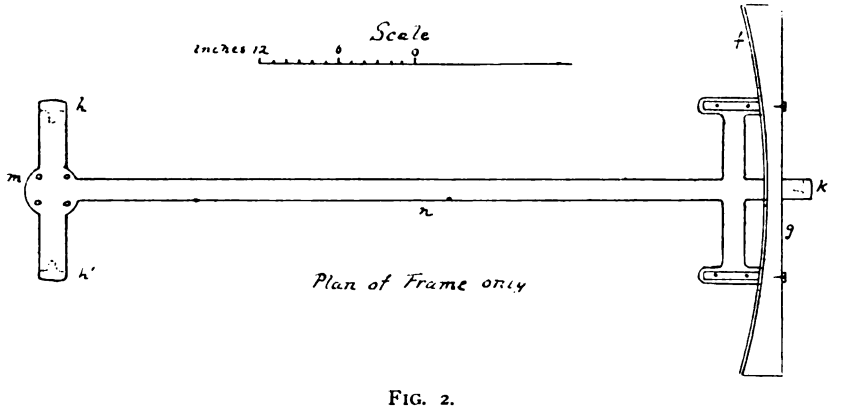


FIG. 2.

a is a ball and socket joint, the ball being attached to the butt fitting at *b*, the socket with a screw collar being carried on a short upright standard *m*. *m* is detachable from the gridiron frame *hh'k* which has three prongs *hh'k*.

Digitized by Google

cd is a light metal attachment at the muzzle carrying a needle *de* which slides in such a way that its line of travel produced passes through the centre of *a*, is parallel to the axis of the bore, and 8″ distant from it.

A light rod, passing down the bore, in contact at one end with the striker and at the other end with a lever at *c* pivoted above *c*, gives the needle *de* a travel of $\frac{1}{2}$″ forward and back when the trigger is pressed.

fg is the sub-target, consisting of a metal sheet 8″ × 24″ bent to a curve of radius $ac + \frac{1}{4}$″. It is backed with wood and is provided with clips to retain two sheets of thin cardboard.

The sub-target *fg* is carried on the gridiron frame *hnk* which is held fast in the ground by three metal prongs *hh'k*.

The cardboard is punctured by the needle each time the trigger is pressed.

METHOD OF PREPARING F.P.S-T.

(1). Peg down the apparatus on a suitable piece of ground from which a good view of country is obtainable. The frame must be driven in flush with the ground by means of a sledge hammer.

(2). Obtain a 6″ map of the country or a mekometer or other range-finder.

Take ranges to any number of objects in positions likely to afford cover.

(3). Set sights and take careful aim at each object in turn, pressing trigger and obtaining a puncture for each object. Carefully mark these and number them consecutively with a pencil making a rough sketch of each object if necessary, to avoid mistakes, and write the range against each.

(4). Remove the card and using it as a register, prick through any number of sheets required, being careful to see that the edges are flush.

(5). At each point on the card stick down a row of head and shoulder figures. These are lithographed on narrow strips of gummed paper and are of 10 different sizes for ranges from 500 to 2,000 yards. See *Fig.* 3.

They are to scale and represent prone figures extended.

(6). If rights are acquired over the ground, corresponding head and shoulder dummies may be spaced at 3 paces interval and fatigue men with blank may be posted at the various ranges.

If no rights have been acquired dummies cannot be used. This makes little difference, as the firers in any case could not see them, and they could only be seen by fire unit commanders when using telescopes or high power field glasses.

(7). Allowance for "error of the day" should be made by the instructor when adjusting sights for the trial shots.

Digitized by Google

Allowance for wind should be made when gumming down the paper strips.

The cards should be prepared before the firers and fire commanders arrive on the ground.

To obtain full value from the instruction there should be six or more of the sub-targets pegged down in a row—several could be carried on one frame on level ground.

Method of Instruction.

1. Insert prepared cards in the sub-targets and when fixed, slide in an extra blank sheet to prevent firer seeing result of his fire.

2. Adjust elbow mats to suit firers.

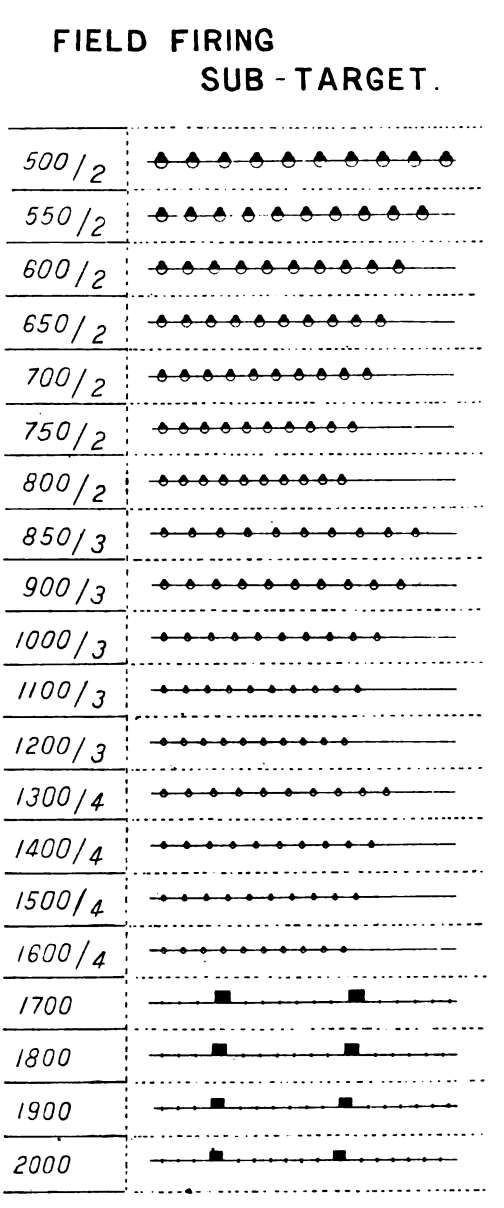
3. Take fire commander to one side and point out one or more targets explaining the number of enemy and their extension.

4. Give (*a*) a time limit in which to describe target and to use rapid fire with an unlimited supply of ammunition.

Or (*b*) a limited number of rounds per man to be expended at discretion.

Other conditions will suggest themselves—such as dispersion, concentration of fire, etc.

5. If desirable give fire commander an observation of his fire by examining



The figure following the range shows the number of paces extension. The targets represent prone figures to scale. A hit in the clear portion of the circle would probably give an effective ricochet. The black rectangles represent the front of a column of fours. The small dots show 10 feet.

Fig. 3.

Digitized by Google

the sub-targets at intervals. This is done by withdrawing the blank sheet.

6. On conclusion of practice remove cards and check results in presence of firers and fire commander, pointing out faults and making deductions.

7. A higher test in fire control can be obtained as follows:—

A company with blank ammunition may be extended to represent the firing line and one man in each section or squad provided with a F.P. Sub-Target. By changing round at intervals, it should be possible to obtain a fair idea of the fire control and its effect.

ACCURACY LIMITATIONS AND COST.

The accuracy of the apparatus is found to be such that a hit or miss can be recorded at 2,000 yards on a prone figure and at 600 yards the portion of a figure hit can be determined provided the gridiron frame is rigid.

In flat country the rows of figures at successive ranges do not foul one another since owing to the increase in elevation for the more distant range, the vertical intervals are much exaggerated.

One limitation is the inability to use blank or dummies but special dummies could be made.

There is a limit to elevation and depression amounting to 10° in a vertical plane.

The lateral limit is approximately 30° with a 24″ sub-target—this can be increased by an alteration in design.

The experimental apparatus has been made for the long rifle, but by a supplementary fitting on the muzzle could be made to fit the short rifle.

If made in large quantities the cost should not exceed £5 per sub-target. Small numbers would cost considerably more. The cost of experimenting and making the experimental model was approximately £30.

Digitized by Google

GIBRALTAR UNDER MOOR, SPANIARD, AND BRITON.

(Continued).

By Col. E. R. Kenyon, R.E.

In 1790–1 the Artillery were commanded by Lieut.-Colonel (afterwards General Sir A. F.) Farrington, whose name was subsequently given to a battery constructed in 1877–9 and now obsolete.

About this time the name of "Cornwall Parade" came into use instead of "The Green Market" for the open space in front of the block of military buildings now used by the Royal Engineer officers as their Mess and quarters. In a Garrison Order of January 20th, 1780, the name "Greenmarket" is used, but in an Order of 14th February, 1791, the artificers are directed to assemble on "The Cornwall Parade" for inspection by the Commanding Engineer. On November 10th, 1783, the 32nd, or "Cornwall" Regiment had disembarked at Gibraltar and on 24th April, 1787, a Garrison Order directed them to move into quarters in the town and they did not leave the station until some years later. The regiment is now known as "The Duke of Cornwall's Light Infantry"; and there is a peculiar appropriateness in their name being specially commemorated in Gibraltar, because it is one of the three survivors of the six regiments of Marines raised in 1702 for the War of the Spanish Succession. As "Fox's," afterwards "Borr's," Marines it was with Rooke at the capture of Gibraltar and formed part of the garrison in the subsequent defence. The other two surviving regiments are the 30th (which was also at the capture but not the defence) and the 31st.* The Greenmarket was never large enough for a regimental parade, but there was an open space on the east side of what is now Governor Street, between it and the "Blue Barracks"—(now the Civil Hospital)—and a note exists in the R.E. Office† that a house at the north-east end of this street was taken to enlarge the parade of the 32nd Regiment, so that it is probable that these two spaces together furnished the regimental parade ground, while the colonel and other officers were no doubt in the present R.E. Mess and quarters.

From 1787 to 1791 Major-General O'Hara was Commandant, during which time‡ the Lines were strengthened, and the Queen's Gate and

* Records and Badges of the British Army.
† MS. List of "Officers' Barracks," 1789.
‡ Drinkwater, p. 27.

Digitized by Google

Road were made under the supervision of Capt. Haynes* who was the Garrison Quartermaster and after whom "Haynes' Cave" was probably named. O'Hara's name was long preserved by a well-known tower on the top of the Rock called "O'Hara's Folly," which Rees says was begun by him under the name of "St. George's Tower" with the intention of raising it to such a height as to enable movements in the harbour of Cadiz to be observed. The British Government, however, disapproved, condemned it to be left unfinished, and (according to Navarette) made General O'Hara pay the expenses out of his own pocket.† The unfinished tower was demolished some years ago; and now the name of O'Hara is perpetuated in a more dignified, if less conspicuous, manner by O'Hara's Battery. General O'Hara returned to Gibraltar as Governor in 1795 and held the appointment until his death in 1802 when he was buried in the King's Chapel where there is a tablet to his memory.

During his Governorship Gibraltar witnessed two naval fights between the British squadron under Admiral Sir James (afterwards Lord) De Saumarez and the French and Spanish Allies. The first took place on July 6th, 1801, off Algeciras the guns of the Spanish forts being able to take a very active part in the battle which resulted in the loss of one British ship, the *Hannibal*, and much damage to the others. The "Trafalgar Cemetery" outside Southport contains a memorial to the Master of the *Cæsar* who fell in this action. Saumarez retired to refit at the Gibraltar Dockyard and on the 12th sailed out again to attack the Allies who were making for Cadiz. The action commenced off Carnero Point (at the south-west of Gibraltar Bay) about 11 o'clock on a dark and stormy night, and ended in a brilliant victory for De Saumarez although the enemy had been reinforced to about twice his strength. Nelson said "A greater action was never fought."‡ The thanks of both Houses of Parliament and a pension were voted to the Admiral, on whom the Order of the Bath was also bestowed the investiture being carried out by General O'Hara on behalf of the King at a great Ceremonial Parade on 16th November, 1801.

The discipline of the garrison during O'Hara's time seems to have been extraordinarily bad; for the next Governor, who was the Duke of Kent, the father of Queen Victoria, was "sent to Gibraltar to restore order in a mutinous garrison."§ The Prime Minister, Mr. Addington, alluding to the drunkenness and insubordination then prevalent there said to him "This state of things cannot be permitted to endure. It has lasted already too long. It must be put down, and Your Royal Highness is the man to do it. You may

* Garrison Orders, March 20th, 1788.
† Rees' *New Cyclopædia*, Vol. XVI., and *Las Llaves del Estrechs*.
‡ *Encyclopædia Britannica*.
§ "Queen Victoria's Letters," 1907.

Digitized by Google

firmly reckon on the fullest measure of support from the Cabinet at home."* He landed on 10th May, 1802, and with very little delay addressed himself to his task. Hitherto the Governors had received the proceeds of the licenses of the wine houses of which there were at least 90, producing a revenue for General O'Hara of some £7,000 per annum. The Duke cut these down to 60 and afterwards to 40; and at the same time took steps to secure a supply of wholesome beer for the troops by starting a brewery at Europa, the memory of which is still preserved by the "Brewery Barracks" part of which stand over the ancient "Nuns' Well" or "Moorish Bath" on a plot of ground which is shown by a plan in the Royal Engineer Office to have been granted to Mr. Ninian Douglas on 9th July, 1802; no doubt for the purpose of building the Brewery which is referred to in Garrison Orders of April 14th, 1803, as "lately established." In that order it is announced that H.R.H. had licensed, for the sale of malt liquor only, three houses, namely, "The Three Light Infantrymen" in Cooperage Lane, "The Three Guns" in Cannon Lane, and the "Halfway House" between Southport and South Barracks, which was to be known as "The Three Grenadiers." Strangely enough it was in one of these very houses—"The Three Guns"—that a mutiny was hatched a few months later which led to his recall on the ground that he had exercised undue severity in suppressing it. The mutiny broke out on December 24th, was suppressed, but broke out again on the night of the 26th. It was again suppressed; and three men were shot for their share in it on 2nd January, 1803, on the Red Sands (now the Alameda) in the presence of a general parade of the garrison. On the day of the execution the Duke issued a Garrison Order in which he attributed the whole affair to drunkenness, but statements by mutineers or their comrades are published in *The Life of the Duke of Kent* detailing an elaborate plot to seize him and force him on board ship for England. The gratitude of the civilian residents for the better order introduced by him into the garrison is very clearly shown by their formal addresses and by their subscription of a thousand guineas after his departure for the purchase of a piece of presentation plate and a diamond "Garter." His active career was closed by his recall to England for which he embarked on May 1st. On his arrival he immediately demanded full investigation of his conduct which however, was never granted, though he was afterwards promoted to Field Marshal and retained his post of Governor until his death in 1820, but without being allowed to return to Gibraltar. His name is rendered familiar to every member of the "Royal Calpe Hunt" by a farm to which he often went and which is a favourite meet of the hounds,—"The Duke of Kent's Farm" on the outskirts of the

* *Life of the Duke of Kent*, by Neale, 1850.

Digitized by Google

Cork Woods. An earlier tour of service which he had performed in Gibraltar in 1790–1, when he was appointed to the command of "The Queen's Royal Regiment," is commemorated by "Prince Edward's Gate" which was opened through Charles V.'s Wall in 1790* and "Prince Edward's Road." Very shortly before his departure, namely on March 30th, 1803, a Garrison Order was issued giving the name of "Gunner's Parade" to the open space in front of the Artillery Headquarter Offices instead of "Governor's Parade" by which name it had previously been known; but the order became a dead letter and the name of "Governor's Parade" is still the official designation of that place although the other name is also often used. Fronting it on the eastern side is the Garrison Library, which owes its commencement to Colonel Drinkwater, the historian of the siege. He founded it in 1793; and it grew so rapidly that Mr. Pitt's government consented to provide funds for the erection of a suitable building which was commenced in 1800 on a site shown on the 1745 plan as "commonly called the Governor's Garden," and in 1753 as "Inhabitants Garden." In 1804 the main portion was completed and in 1867 another wing was added. Attempts to form a museum in connection with it have been made but most of the articles collected have unfortunately been allowed to be dispersed, while the societies formed for scientific research and discussion have, after a more or less precarious existence, faded away, leaving little trace except some records enshrined in a minute book preserved in the Mess of the officers of the Royal Engineers.† A small collection of geological specimens has recently been arranged in the Library.

The Brewery founded by the Duke did not long survive his departure, and in Garrison Orders of 14th January, 1805, we read "The detachment of the Queen's, 13th and 54th Regiments now at Europa and Windmill Hill will occupy Douglas's Brewery at 4 o'clock this afternoon," so that the Brewery was converted into "Brewery Barracks" within 2½ years from the granting of the site to Mr. Douglas.

From September to December, 1804, a virulent fever raged in Gibraltar which carried off nearly 6,000 persons out of a population of 15,000. There is little doubt that it was the West Indian yellow fever; and it is now known that one of the Gibraltar mosquitoes is identical with that which carries the germs of that fever, a fact which accounts for its rapid dissemination when once introduced. One result of this epidemic was the building by the British Government in 1805 of the "Governor's Cottage" at Europa as a summer residence for the General Commanding the Garrison, its first occupant being General Fox who was appointed Lieutenant-Governor in 1804 in

* Garrison Orders, September 24th, 1790.

† This book has now been handed over to the Garrison Library.

Digitized by Google

succession to General Trigge who had taken over the command from the Duke of Kent in 1803. A curious and interesting occurrence in connection with this fever was a conference which took place in October, 1805, on the Neutral Ground between the British medical officers who had been fighting the epidemic and a party of French doctors who had been travelling in Spain for the purpose of investigating the outbreaks of a malignant fever which had occurred in various parts of that country. The interview was arranged at the request of General Castaños, commanding the Spanish forces, although England was then at war with France and Spain; and the meeting actually took place a few days before the Battle of Trafalgar.*

Outside the Southport is the little Trafalgar Cemetery which by its name reminds us that after that battle the British fleet put into Gibraltar,† some of those who died from their wounds being buried there. It is however a mistake to suppose that its use as a cemetery dates from that time. It was consecrated in June, 1798.‡ The earliest legible inscription is to the memory of Capt. John Knipe of the 90th Regiment who died in 1798; and there are many memorials to persons who died during the fever of 1804.

The figurehead of the Spanish line-of-battle ship *San Juan*, captured at Trafalgar used to be in the Alameda but has long ago disappeared.§

A quaint incident illustrative of the amenities of war is recorded in the *Gibraltar Chronicle* of June 1st, 1805, where there appears an indignant account—(called forth by the publication of the French version of the same episode)—of a raid which was made in March on our line of advanced posts, and which resulted in a subaltern and four soldiers being carried off from the Devil's Tower guard. The *Chronicle* characterizes the attack as "a step so unusual amongst civilized nations, even during a war, as attacking advanced sentries by a large body of Banditti and Felons armed with pikes and daggers without having any further object in view," and states that General Castaños—who was then in command of the Spanish forces—"in the most

* *Gibraltar Chronicle*, October 12th, 1805.

† *Chronicle*, November 2nd, 1805.

‡ This is proved by the following facts:—Vol. XI. of the Garrison Orders is an index and contains the following entry: "June 4th, 1798. The new Burial Ground to be consecrated." The actual Orders of 1798 seem to have been destroyed, but in 1799 Orders are recorded on 24th August and 16th November for the funerals of Capt. Tuffie, of the 44th Regiment and Lieut. Montresor of the 18th in "The New Burial Ground." These two officers are buried in graves Nos. 43 and 2 respectively of the "Trafalgar Cemetery" as recorded in the Royal Engineer Office.

§ *Travellers' Handbook* which describes it as "a statue harpooning a fish." A gardener who has been there 31 years (1910) had heard of it but never seen it.

Digitized by Google

unequivocal terms expressed his abhorrence of a transaction which every Spanish officer and gentleman must contemplate with indignation, and remanded the officer and men who had been thus kidnapped by the Convicts, declaring that he could not consider them as prisoners of war." In another sentence the *Chronicle* describes the raiders as "Galley slaves," and even from the French account it would seem that there was something peculiar about the affair as it describes the 180 men who made the attack as armed with hatchets and other weapons.

The changeful politics of Europe under the Napoleonic *régime* now brought about a complete revolution in the mutual relations of Great Britain and Spain. In 1808 Napoleon forced his brother Joseph on to the Spanish throne; the nation rose in arms against this usurpation; England, which was already in alliance with Portugal, aided Spain; and the Peninsula campaigns were fought out. The present ruinous condition of the old masonry works on the Spanish frontier line is a curious reminder of the changed relations thus introduced. In 1727 the Spaniards erected a fort at Punta Mala* and a strong line of bastioned fortifications across the isthmus, commencing with Fort San Felipe on the west and terminating with Fort Santa Barbara on the east; but in 1810 when the French were overrunning Andalusia General Castaños, fearing that they would seize these works and so get an aditional grip on the country asked the British Commandant to destroy them. He had already in 1809 obtained the assistance of the British artillery to remove the guns, etc., from his Lines and to ship them to Valencia and Catalonia.† Accordingly a detachment of the Military Artificers under Capt. G. J. Harding, R.E. (afterwards Sir George Harding, K.C.B.), covered by from 500 to 800 other troops was sent out from Gibraltar to blow up the whole of the Lines on the frontier, a duty which occupied some months.‡ Some of the materials were used in fortifications and buildings in Gibraltar§ as, for instance, in the buildings behind the fountain on Governor's Parade. They also destroyed all the works and barracks round the bay, including the batteries of Punta Mala, Torre del Mirador (close to the River Guadaranque), and Cabrita Point. In this they were assisted by a Portuguese squadron on January 10th, 1810, without interference from the French although they were on that same day at both Tarifa and Algeciras. On February 25th a sharp skirmish took place between a Spanish cavalry detachment from the fortress and a French party which had come down from San Roque into Campamento. The Spaniards drove them off and returned to

* Montero, p. 340.
† *Gibraltar Chronicle*, 28th January, 1809.
‡ Conolly's *History of the Royal Sappers and Miners*.
§ Montero, p. 308.

Digitized by Google

Gibraltar where a Sardinian officer who had fallen in the fight was buried.* Harding was again in Gibraltar in 1844† when he was in command of the Royal Engineers as Colonel; and his name is attached to a battery (now obsolete) constructed in 1876–8 at Europa. While the French were occupying San Roque its unfortunate inhabitants (whose ancestors had fled thither from Gibraltar in 1704) took refuge at Catalan Bay where some of them were killed in December, 1811, by the fall of a great boulder which killed 18 persons and wounded others.‡

Another instance of help given by Gibraltar to Spain was afforded in 1812 when four men of the Royal Military Artificers and an Engineer officer were employed on Verde Island off Algeciras in repairing its defences.§ During this same period (1808–12) the naval establishments were increased by the addition of the Victualling Yard at Rosia.‖ In 1813 a village was commenced on the Neutral Ground which was subsequently developed by Sir George Don into a suburb of about 100 wooden huts which were only occupied from the 1st June to the 1st December, but now form the permanent hutment on the North Front.¶

In connection with these events of the Peninsula War allusion may here be made to Jones' Battery which although it was not constructed until a much later date preserves the name of an officer of R.E., Sir J. Jones, who was greatly distinguished in that war and who is the classic historian of its sieges. In 1841 he recommended the construction of a 10-gun battery on the site of the Chief Engineer's garden. In 1859 a report on the defences of Gibraltar was furnished by Colonels Lefroy and Owen of the R.A. and R.E. who point out with some indignation that although "Jones' Battery" has been built it is on a higher site than that selected by its distinguished godfather; and state their hopes that this change of site was due to no personal motives. They evidently thought that some former Engineer officer had not been proof against the temptation to sacrifice the public interest to the preservation of his garden. Fortunately, however, it appears that Colonel Harding, R.E., who recommended the change of site and obtained the War Office authority for it, was supported by his colleague in command of the Artillery. To these two officers every succeeding commanding officer of Engineers owes a deep debt of gratitude; and the British public may rest assured that its interests have not suffered when they know that the battery,

* *Gibraltar Chronicle* of January 10th, February 14th, and 25th, 1810.
† *Travellers' Handbook.*
‡ *Gibraltar Chronicle* of December 10th, 1811.
§ Conolly.
‖ *Directory*, p. 35.
¶ Hennen, p. 72.

Digitized by Google

having long since gone the way of most fortifications in their turn, has been relegated to the obsolete class and now serves as a stable for the horses of some Artillery officers.

In October, 1814, General George Don arrived to assume the duties of Lieutenant-Governor; and to him are due many public improvements. In 1815 he promoted the scheme for laying out the "Red Sands" as an Alameda which was formerly opened for the use of the public in April, 1816. In the same year the Civil Hospital, which had been constructed out of the ruinous "Blue Barracks" which stood on the site of the ancient monastery and hospital of San Juan de Dios, was opened. The building was enlarged in 1880 and again in 1902. In September, 1889, it was converted by Ordinance from a civil hospital under private management into a Government institution under the title of "Colonial Hospital." In 1820 the Duke of Kent died and was succeeded as Governor by the second Earl of Chatham whose name was given to one of the Counterguard fortifications and is inscribed on the outer face of the Grand Casemates Gate. He retained the appointment until his death in 1835, and actually discharged the duties from 1821–26 when Sir G. Don was reappointed Lieutenant-Governor. The titles under which property is now held and the records of the Crown Lands Office date from 1821, the commission for the revision and settlement of titles having been appointed in 1817 and the settlement taking effect from 1821.

In 1828 a sanatorium for officers was built at Europa, but as it was found to be cheaper and more satisfactory to send invalids home the building stood empty and acquired the name of "Bleak House" which still attaches to it although it became the Officers' Mess when the adjoining hut-barracks were built. It is now occupied by the Royal Artillery.*

The foundation stone of "Holy Trinity Church" which is now the English Cathedral was laid in 1825 but the Church was not completed until 1832, in January of which year Sir George Don died and was buried in it. A tablet to his memory is in the Cathedral Library, and another, together with his bust is over the entrance to the Exchange which was opened in 1818.

Here it will be convenient to anticipate the exact chronological order of events in order to bring together the main facts in the history of the Cathedral.

The Cathedral Church of the Holy Trinity.

The building was commenced as above stated in 1825 but proceeded very slowly; probably because it was being executed by convict labour. On February 10th, 1831, a peremptory letter from Downing

* *Gibraltar Directory.*

Digitized by Google

Street called upon Sir George Don to report as to the measures he proposed to adopt "for finally securing to the Inhabitants and Garrison of Gibraltar the accommodation which they have so long required of a convenient and decent place of Worship; and which, it is quite clear, they would have enjoyed long ago, but for the negligence with which the operation of erecting this building has been conducted." On 24th October, 1832, the Principal Chaplain to the Forces reported that the Chaplain to the Forces at Gibraltar had notified to him the completion of "the New Church in that Garrison," and requested that arrangements should be made for its consecration.

On 15th June, 1833, orders were given from England for the "Government Chapel" (*i.e.*, King's Chapel) to be closed; and a wish was expressed that the "Chaplain to the Government of Gibraltar" and the "Military Chaplain" should find it convenient to perform service in the New Church alternately. The Governor had previously reported that half of the Church was "occupied by benches for the military and the other half by 71 pews containing about 348 seats or accommodation for as many of the Protestant inhabitants as will attend Divine Service."

On 12th August, 1833, a warrant was transmitted from the Archbishop of Canterbury authorizing the Government Chaplain (Mr. Hough) to consecrate the Church; but apparently this warrant was not acted on, for on 13th June, 1838, a fresh warrant (now in the custody of the Cathedral Trustees) was issued by the Archbishop authorizing Dr. Burrow, the Civil Chaplain, to carry out the consecration and recording that the Church was built "for the accommodation of a large proportion of the civil population and of the troops." Accordingly on the 17th October, 1838, the Church (which is described in Garrison Orders as "the Garrison Church" and in the *Gibraltar Chronicle* as "the Protestant Church") was consecrated by Dr. Burrow in the presence of Queen Adelaide and Prince George of Cambridge. On October 15th, 1842, the *Gibraltar Chronicle* published an extract from the *London Gazette* of 30th September announcing that the Queen has constituted Holy Trinity Church a Cathedral Church and Bishop's See, and has ordained that the whole town of Gibraltar shall henceforth be a City and be called the City of Gibraltar, and has constituted "the said City and all the territory comprised within Her Majesty's possession of Gibraltar and its dependencies to be a distinct diocese and to be called the Diocese of Gibraltar." The *Gazette* proceeds to appoint the Rev. G. Tomlinson, D.D., to be consecrated as Bishop of the said See with jurisdiction within the churches, chapels, and places, set apart for Church of England services in Malta and its dependencies.

The letters patent of 30th September, 1842, were however revoked

Digitized by Google

by a proclamation which is published in the *Gibraltar Chronicle* of December 16th, 1873, the see being then vacant. Since that date there have been only two Bishops, namely the present Diocesan, Dr. Collins (consecrated in 1904), and Rev. Charles Sandford who was consecrated on 1st February, 1874, an account of the ceremony appearing in the *Chronicle* of February 9th. These consecrations have taken place under the authority of a licence issued by the Crown to the Archbishop of Canterbury. There are some 30 Bishops who are consecrated in the same way for certain missionary or colonial sees; this practice having been adopted since the decision of the Privy Council in the case of the Bishop of Natal (1865) threw doubts on the validity of many of the letters patent.

In 1869 Lord Granville, as Secretary of State for the Colonies, decided to hand over the Churches and Chapels of Gibraltar to the different Communions. Lord Kimberley in 1872 stated that this was subject to the right of the Crown to resume possession in case of military necessity; and in 1902 Mr. Chamberlain agreed that this reservation of Crown rights need only relate to time of war, so that now the Church, though used with the consent of the trustees for parade services during the summer months (on payment of a small sum by the War Office) is no longer the garrison church but is purely the Cathedral of the diocese and the parish church of the English community, whether civil or military.

The King's Chapel as Garrison Church.

As we have seen above this Chapel was closed by order of the home government in June, 1833, the Church of the Holy Trinity having been completed in the previous year for the use of the troops and a large proportion of the civil community. In 1842 Sir R. Wilson assumed office as Governor; and in an official letter dated 8th March, 1844, the Assistant Military Secretary says: "When the Governor assumed this government, he found the Convent Chapel in a neglected, dark, unwholesome, abandoned state, and a Sepulchral nuisance to the Residence."*

On 31st August, 1843, an expenditure from civil funds was authorized for "fitting up the Convent Chapel for the use of the Troops so as to afford an increase of room to the civil population of Gibraltar" in the Cathedral; and the Garrison Orders of 1st March, 1844, speak of "the King's Chapel having lately been appropriated exclusively for the use of the Troops."

The letter of March, 1844, proceeds to state that "There was no record of any intention to restore the Chapel for the Garrison's use, the requisite accommodation being provided in the Cathedral, but the

* Official Letter-book at Government House.

Digitized by Google

Bishop and Archdeacon stated to the Governor that the Protestant community at large experienced great inconvenience from the Cathedral being so filled by the Military that insufficient place was left for the Civil congregation. The Governor therefore applied for, and obtained, permission to restore the Chapel as an *auxiliary*, or Chapel of ease, to the Cathedral, and not as *heretofore* as the *sole* place of worship for the Garrison."* The restoration was carried out in 1843 at an expense of about £240, with an additional expenditure of £63 on furniture. The Secretary of State's despatches show that the Convent Chapel was to ease the Cathedral, not by being thrown open to the whole community, but by being adapted "to the accommodation of the troops." The troops continued to use the Cathedral also, free seats for 60 persons and 1 Staff Officer being assigned to them.

Gradually, as the Garrison was reduced and as other chapels were provided in the South District, the King's Chapel became what it is now, namely the sole Garrison Church for the North District.

We must now resume the interrupted summary of the general history of the Rock. In 1838 the foundation stone of the lighthouse at Europa was laid by Sir Alexander Woodford who had succeeded Sir George Don as Lieutenant-Governor in 1835 and had become Governor in 1836. His name is given to one of the now obsolete batteries at Europa. He was the last of the Lieutenant-Governors, that office being definitely abolished in 1839. The light was first shown in the lighthouse in 1841.

That the never-ceasing process of keeping Gibraltar's fortifications up to date did not cease in Queen Victoria's reign is testified to by "Prince Albert's Front" (1842), "Eliott's Battery" (1845), "Wellington's Front" (1846), and the extension of "Prince of Wales' Battery" which is commemorated by a memorial stone laid by King Edward VII. during a brief visit in 1859 which may be seen in the parapet, besides the Victoria Battery and others which need not be particularized.

During Queen Victoria's reign were built the Presbyterian Church of St. Andrew on Governor's Parade (1852), and the Roman Catholic College of St. Bernard for youths on Europa Main Road (1865). This college had been opened in 1858 in a building on the New Mole Parade from which it was transferred to the new site. Some years later, not being a financial success, it was closed and the buildings were utilized for the Loreto Convent and the "Little Sisters of the Poor,"

* This it had been in former days, but as it obviously could not accommodate the garrison, the troops used to parade for service in the open air on the "Grand Parade" now "Commercial Square."

Digitized by Google

and it was to the Chapel of this institution that the image of the Virgin from the ancient shrine of Europa was restored in 1866. St. Bernard, it may be mentioned has been the Patron Saint of Gibraltar since its capture by the Spaniards in 1462 on St. Bernard's Day: (August 20th).

The Wesleyans already possessed their Chapel, one having been built in 1810 on a leasehold site, the lease of which was extended in 1828 and ultimately was converted into a freehold.*

In 1875 the convict establishment which had been commenced in 1842 with a party of 200 convicts on board a hulk for the purpose of employing them on public works, was broken up. The convicts were transferred to England and the buildings, which were in the Dockyard, were taken over by the Admiralty. The rectangular block which projects from the Line Wall into the Dockyard a little south of Cumberland Flank is the relic of this establishment. Ten years later (March, 1885) a more interesting prisoner was consigned to Gibraltar, namely Zobeir Pasha, the great slave dealer of the Soudan, whose power for evil in that vast district was broken by General Gordon during his tenure of office as Governor-General of the Soudan (1877–80), and whose son Sulieman was executed under Gordon's orders by his lieutenant, Gessi, when he revolted. It was this same Zobeir whose great influence Gordon wished to utilize in carrying out the task entrusted to him in 1884 of evacuating the Soudan and sending down the Egyptian garrisons and civilians before the advancing Mahdi should overwhelm them. This is not the place to repeat the story of Gordon's efforts, of his gallant defence for ten months of Khartum, and of his death there on January 26th, 1885. The British Government felt that it was unsafe to allow Zobeir to reside in Egypt after these events and deported him to Gibraltar where he was interned in the Governor's Cottage until August, 1887, when he was allowed to return to Egypt, where he lived in Cairo until the death of the Khalifa, after which he was allowed to return to the Soudan where he occupies himself with agriculture and has made his estates an object lesson in improved methods.†

Until 1885 no civilians were allowed to be in the streets after midnight without permits, but in June of that year the Governor, Sir John Adye, removed this restriction.

In 1891 an indication was given of the increased use to be made of Gibraltar by the Navy. From 1816 until January, 1891, the Naval

* An interesting history of the Wesleyans in Gibraltar is given in the *Gibraltar Chronicle* of January 16th, 18th, and 19th, 1909.

† *Our Soudan: Its Pyramids and Progress*, by John Ward, p. 356. J. Murray, 1905.

Digitized by Google

Hospital had been lent to the military authorities, but a portion of it was now resumed for the Navy; and in 1904 the new Military Hospital on the Europa Main Road was taken into use, thus enabling the two establishments to be entirely separated.

In 1891 an event of some importance to the welfare of the town took place in the reorganization of the Sanitary Commissioners, a body which is charged with many of the duties of a municipal authority but which is in close relations to the executive authorities, both military and civil, there being on it a majority of official members selected by the Governor from the civil and military services with the addition of a naval member. Under this reorganized body an extensive scheme for an improved water supply was inaugurated. Only a portion of it has yet been carried out, consisting of a collecting area and fine reservoirs, but it is to be hoped that ultimately the whole project will be completed so that not only will there be ample storage based on modern ideas as to the necessary amount of water, but also that there may be a proper system of distribution by pipes, so as to eliminate the risks which are inseparable from the present system of distribution by water butts, casks, and buckets, and of storage in numerous private underground cisterns. The Colonial Government has transferred to the Commissioners its electric lighting undertaking, and the system has grown very considerably but financially it has not yet been an instance of successful trading by Government or other official bodies.

On March 17th, 1891, a most terrible disaster occurred in the bay, the *Utopia*, an emigrant ship, coming into collision with the ram of the battleship H.M.S. *Anson* and sinking within a few minutes. A heavy sea with driving wind and rain increased the difficulties of rescue work, and notwithstanding the prompt and gallant help given by all the men-of-war boats, including those of a Swedish ship, the *Freya*, 551 persons were drowned, of whom 130 were buried at the North Front.

In 1892 a great addition to the amenities of Gibraltar was given by the completion of the Algeciras-Bobadilla Railway, the first section of which had been opened in October, 1890.

In 1893 the construction of the modern harbour and its accompanying great extension of the Dockyard was commenced by extending the South Mole, which it will be remembered had its origin in the "New Mole" constructed in the reign of Philip IV. (1620) with a length of 300'. In 1851 it had been extended to a length of about a quarter of a mile.* The new harbour encloses a space of 440 acres of water and is equipped with a very fine dockyard.

* *Gibraltar Directory.*

Digitized by Google

The Caves.

Gibraltar, like all masses of limestone has many fissures and caves and it is said that in no place are they more numerous within a similar compass. They are of two kinds :—(1) Littoral or sea caves scooped out by the action of waves at sea level; and (2) Inland caves which are in fact magnified fissures in the rock. The sea caves are found at very different levels; some at the present sea level, as those in the cliffs north of the Governor's Cottage; Monkeys' Cave about 100′ higher up; Beefsteak Cave in the cliff above the south-east corner of Europa Flats; Genista Cave No. 4 which is nearly over the stables of Governor's Cottage, having its entrance in the face of the cliff about 40′ below the top; Martin's and Figtree Caves, about 600′ above sea level; some caves just above the top of the sand slopes of Catalan Bay; and Poco Roca Cave about 700′ above sea level; besides many others of less importance, but all marking, as these do, the position in ancient geological periods of the coast line at successive epochs. Of the inland caves the finest examples are the celebrated "St. Michael's" Cave; "Genista" Nos. 1, 2, and 3 in the Windmill Hill plateau; "Glen Rocky" Cave; and the great "Mediterranean" Cave discovered in August, 1902, in the course of the Admiralty quarrying operations, which is a most remarkably fine stalactite cave, containing stalactites and stalagmites of an infinite variety of form and size.

Careful geological examination of the four Genista Caves, Martin's, Figtree, St. Michael's, Poco Roca, and Glen Rocky were carried out by Capt. Brome (1863–68) who discovered the Genista group and the series opening out of St. Michael's to which he gave the name of "Leonora's." The name "Genista" was a play upon his own name, being the Latin for the plant "broom"; the Genista magazine therefore affording an abiding memorial of his work, although unfortunately it has absorbed the principal cave in his group of discoveries. The results of his work are narrated by Professor Busk;* and the most important facts are also summarized in a report by Dr. Falconer and Professor Busk to Sir William Codrington, the Governor of Gibraltar.† They say "The discoveries have not only yielded unexpected results regarding the former state and ancient animal population of the Rock itself, but they further point to a land connection between the southern part of the Iberian Peninsula and the African continent at no very remote geological period. . . . The fossil remains establish beyond question that the Rock was formerly either peopled by, or the occasional resort of, large quadrupeds like

* *Transactions of the International Congress of Prehistoric Archæology*, 1868.

† *Gibraltar Chronicle*, January 23rd, 1865.

Digitized by Google

the elephant, rhinoceros, aurochs, deer, ibex, wild horse, boar,* which were preyed upon by hyænas, leopards, African lynx, and serval. Several of these are of extinct species. They were not cave-dwellers, but their bones had been for the most part washed by the action of rain into the fissures and caves where they were found. There must have been abundant trees† and more or less constant green food. . . . Human remains were found in great abundance in the upper chambers. They appear to have belonged to between 30 and 40 individuals. They were accompanied by stone implements of the polished stone period, broken querns, a large quantity of pottery, marine shells of edible species, and other objects. . . . That the upper chambers of the cave were ever inhabited by savage man, we consider to be highly improbable. It seems more likely that they were used for the funeral rites of the dead." The writers urge most strongly the great necessity for establishing and maintaining a local museum in the interests of the world's science ; but such an institution is still conspicuous by its absence, though its germ exists at the Library in the shape of some geological specimens and remains of bones found in the caves and recently arranged by Major Howell Jones, R.A. Many of these animal remains are from Collin's Cave behind Catalan Bay.

The excavations in Genista No. 1 extended to about 300′ measured horizontally in a S.W. direction from the prison wall and 290′ vertically below the Windmill Hill plateau, that is to a point about 80′ above sea level. In it were found the remains above described.

Martin's Cave was discovered in 1821 by a soldier whose name it bears, and is some 600′ above sea level. In it Brome found, partly under earth and partly under stalagmite two ancient swords very much broken and also a plaque of Limoges enamel under 18″ of stalagmite, all being of the end of the 12th or beginning of the 13th century ; besides remains of human beings, animals, birds and reptiles, pottery, stone axes, flint knives, etc., similar to those in Genista. At Figtree, St. Michael's, and the other Genista Caves he found similar remains, but before he could complete his exploration of St. Michael's he was unfortunately stopped by a War Office Order forbidding the employment of the military prisoners on such work.

* So late as 1784 it would appear that there were wild boars on the Rock, for on November 22nd the following Garrison Order was issued:— "Information having been given to the Governor that two wild boars were lately shot on the Hill, it is his positive orders that no person whatever presume at their peril to shoot on the Hill in future."

† Ayala (p. 35) states, on the authority of the astronomer Euctemon, who flourished about 430 B.C., that "the forests which covered the Rock produced a religious fear in those who ascended it"; and Montero (p. 224) says that in 1525 A.D. the Sierra Carboneras was covered with serviceable trees for ship-building, which were used by Don Alvaro de Bazan, Governor of Gibraltar.

Digitized by Google

In Poco Roca he found a quantity of blown sand similar to that which forms the slope above Catalan Bay, giving rise to the belief that probably there are fissures communicating between this cave and the eastern face of the Rock. In 1789 this cave was prepared for the residence of the Governor, but was never so used.

The Genista skulls were found to be of the same character as the Basque skulls described by M. Broca in 1862 and 1868; and both have a very close analogy to those of the Kabyle tribes now inhabiting much of North Africa, leading Professor Busk to surmise that the primitive inhabitants of the Iberian Peninsula and those of North Africa may have been the same race.

A far more ancient skull now lies in the museum of the Royal College of Surgeons which has been stated by the Curator (Professor A. Keith) to be that of a woman who may have lived 200,000 years ago. The exact circumstances under which it was found have unfortunately not been recorded. The earliest mention of it which has been traced is the following note in the minute book of the "Gibraltar Scientific Society" (now in the custody of the Garrison Library) under date March 3rd, 1848:—"Presented a Human Skull from Forbes' Quarry, North Front, by the Secretary." That quarry is now disused and is south-east of the ancient Forbes' Barrier. In it is a small cave which is conjectured to have been the place where the skull was found. The secretary in 1848 was Lieut. Flint, R.A., who died at Mauritius as a Captain in January, 1857. The society's last record is under date May, 1853.

St. Michael's and Leonora's Caves.

In the Royal Engineer Office there are several records and sketch plans descriptive of explorations of St. Michael's Cave, which should be studied by anyone desirous of thoroughly examining it.

These explorations were solely directed to ascertaining the extent of the cave and to facilitating the safe passage of future investigators. The earliest of these records is a report by Capt. Webber-Smith, of the 48th Regiment, addressed to the Governor, Sir A. Woodford, in November, 1840, and describes minutely all the different passages which may be followed. All lead to a precipitous descent from the upper to a lower cave, at a distance of about 215′ from the entrance. This precipice can only be descended with the aid of ropes. There are five distinct passages over it, the falls being respectively (commencing from the northern side of the cave) 50, 40, 60, 80, and 150 feet in depth. In describing the approach to the one 150′ deep, Capt. Webber-Smith speaks of "many passages leading into one another" and says "I am inclined to believe that it is in these passages that Colonel Michell and his friend lost themselves some years ago. A little below where they join the main shaft, a branch leads away from

Digitized by Google

it, and there we found A.B. cut in the rock. The name of Colonel Michell's friend was Brett, and to this point they probably descended. Beyond this we found no trace of anyone." He proceeded about 170′ further and was then stopped by a small rock which blocked the narrow passage. Capt. Smith does not give the names of his companions. On August 29th, 1857, Lieut. Alfred G. Goodall, R.E., adds a memorandum that he found a small opening beneath this rock which gave him access to a series of small caves and passages. The furthest point to which he reached was about 180′ beyond the rock which stopped Smith. There he came to "a very soft sandstone in which the cave evidently terminates as it is of too friable a nature to admit of any opening remaining long in it. The air up to this point is still good." Several of the passages ended in small pools of water. There is yet another addendum by Lieut. Charles Warren, R.E. (afterwards Sir Charles Warren)—"In 1861 this last grotto was explored by a party for several days, and ultimately a small opening was found, not large enough for the entrance of the smallest child. Jumpers and chisels were brought down, and after hard work for two days the entrance was made large enough to admit a moderately developed man. A suite of small grottoes was then discovered; into which there is little doubt that man had never yet penetrated. In one of these was an extraordinary collection of stalactites which, on being struck with metal, emitted clear bell-like notes, which resounded throughout the caves with a wonderful effect." Accompanying this note is a plan copied by Warren "from a sketch by Lieut. Gamble, Royal Marines," which shows that this suite of grottoes did not carry them much further into the heart of the mountain. Smith's and Goodall's plans show their general direction to have been westwards, with a slight inclination to the south. Warren and Gamble place their furthest point in what they call the "bell grotto" as very near, but slightly north-east of Goodall's sandstone. On 10th March, 1879, Major Willoughby Verner, of the Rifle Brigade, explored the cave with Lieut. Carpenter, R.N., and a party of seamen from H.M.S. *Nassau*, and spent $4\frac{1}{2}$ hours on the job. They assumed the depth of the top of the precipice to be 200′ feet below the entrance of the cave. From that point onwards they measured the depths (apparently by lines) and found the lowest point to be at a further depth of 420′, or a total of 620′ below the entrance. Their furthest point is recorded on a paper in a soda-water bottle "in the centre of the cavern in a small heap of stones." Other explorers had left records by names and dates scratched on the rocks and by soot from candles on the stalagmites and walls. There was water at the bottom and "a decided current of air in some places." They do not seem to have passed Goodall's and Warren's furthest points.

In Professor Busk's paper are quotations from Warren saying "The

Digitized by Google

bottom of the cave is 288′ below the entrance of the gate," and "I obtained the depth accurately both by measurement and with the aneroid barometer." Probably this refers to the bottom of the cave proper after descending the precipice but before entering the narrow passages and grottoes beyond. This would agree fairly with Verner's record which gives a depth of 270 to 350′ to that part, according to the place where it is taken.

Of course all the measurements must be subject to many inaccuracies, but the general result seems to be that it is possible to penetrate to a point about 565′ in an east-south-east direction, and about 620′ below the entrance, both measurements being taken from the mouth of the cave. This would place the lowest point at about 370′ above sea level.

Opening out of St. Michael's Cave on its northern side is a beautiful series of stalactite caves discovered by Capt. Brome and described in Professor Busk's paper, to which the name of "Leonora's Caves" has been given.

At one time it appears that an attempt (which happily failed) was made to change the name from St. Michael's to St. George's Cave, for the latter name occurs in "A Description of Gibraltar, with an Account of the Blockade, Siege, etc., etc.," 1782; and also in Dodd's *History of Gibraltar*, 1781.

(*To be continued*).

Digitized by Google

MAJOR-GENERAL SIR WILLIAM REID, R.E., G.C.M.G., K.C.B., F.R.S.

(Concluded).

By Col. Robt. H. Vetch, c.b., late R.E.

After the death of Lady Reid, Sir William remained only a short time in Malta. His successor, Major-General Sir John Gaspard le Marchant, commanding the troops in Nova Scotia, was expected to arrive from Halifax towards the end of April and Reid only waited for his arrival to return to England. The *Malta Times* of the 27th April had an appreciative article on the retiring Governor, from which I make a few extracts to show the estimation in which he was held by the Maltese in the view of the leading organ of public opinion in the island :—

"We well remember the state of parties in Malta during the Governorship of Mr. Moore O'Ferrall. . . . The storm was at its height when Sir William Reid assumed the reins of government. Six years have elapsed and when—placed as we are in the present interregnum—we take a retrospective look, we see a contrast that can scarcely be more striking. In a few days Sir William will bid adieu to the shores of Malta. On arriving he was not fêted like his predecessor, nor was he at first carried to the clouds and afterwards abused as O'Ferrall was. Unlike him Sir William's ambition never was to become, and he never, in fact became, a reformer. He held the reins with a gentle hand, and his moderation was influential.

"Since the days of Sir Alexander Ball we veritably believe that the population was never more free from political agitation, was never more sober minded, nor was the natural propensity of our fellow subjects to grandiloquence and vociferation ever more generally exchanged for quiet and common sense, than at the present moment. . . . Whatever Sir William Reid's policy may have been it was new to Malta, and its effect was sedative. . . . If, as we believe, it was one of the results, to the attainment of which he set to work from the very beginning of his sway, to adapt this population, by habit of calm deportment and tranquil reflection, to the management of political institutions, his object has been crowned with success beyond all expectations. . . .

o o o o o

"We are persuaded that all possess a latent consciousness that he has done good. A proof of this lies in the number of well-wishers and friends that he leaves behind him: and a still greater proof is to be

Digitized by Google

found in the absence of a single enemy or opponent. All acquiesce in the tacit conclusion that he is a just and upright man, endowed with a good will and a good heart, and influenced only in his resolves by a sense of duty and by a sense of justice. These are great virtues in any man, especially in a Governor; but they are virtues more felt than understood.

"The fact of a Governor throughout the whole of his administration being always accessible to all, high and low, always ready to hear, always inclined to examine wrongs and to give redress, who is only timid from fear of being less than just, constantly bent on this one dominant idea,—the fact of a public officer who, for six years, may be said to have never left his post, who has entered day after day into the minutest details of business, who has ever made it a point to consider the case of the meanest subject of Her Majesty entrusted to his care, with as much diligence as he would that of the highest personage, deserves prominent mention. Such virtues leave a deep and indelible trace behind them. . . . Malta may consider itself blessed if its future rulers, in lieu of more showy qualifications, are possessed with the deep love of justice and strict impartiality, which form the basis of the character of our departing Governor."

Sir William Reid reached England in the middle of May, 1858. He took a house in Gloucester Terrace, Hyde Park—No. 117. Writing to his daughter, Mrs. Gambier, soon after his arrival he tells her "It is a small house, but will do; I am tired of palaces." After making a round of visits to relations and friends, he wrote to the same daughter, on the 13th September from Gloucester Terrace, the last of the few letters from his pen that have been preserved. The following extracts from it, in view of the date at which the letter was written—only a few weeks before his death—have a pathetic interest:—

"I came up from Mr. Alcock's on Saturday, intending to go by sea to Scotland this morning, but I found that the steamers sail on Wednesday, so I have booked myself for Wednesday next.

"I parted from Charlotte and Grace (his unmarried daughters) at the Redhill Station, from whence they were to go to Chichester. I was pleased with Miss Nepean (afterwards Lady Fyers) and her sister, and also with Mr. and Mrs. Alcock.* They were very civil to us and want to be acquainted with you.

"To-day came an invitation to visit Mrs. Holland at Dumbleton, which I answered by saying we should be happy to go in October, should that suit them. . . .

"I suppose your sisters told you that I have bought the remainder of the lease of this little house. . . .

"Don't let me forget your beehive; I have been so much out of town that I have not been able to choose it yet. I don't know when I can

* See footnotes, p. 201, *R.E. Journal*, March, 1910.

Digitized by Google

come to see you all, but come I intend, if alive and well, some day again: and ere long if I can. . . .

"Did you see the fearful accident to the Duchess of Somerset last week? Going to-day to ask after her, she has made me promise to dine with her and a small party to-morrow, which I did not wish. . . ."

Sir William Reid's health had been far from good for some time. The death of his wife had told heavily upon him. But there had been nothing to cause his family to be alarmed, or even disquieted. In the following month, however, he was taken seriously ill with some internal trouble. His unmarried daughters were with him and nursed him tenderly. He arranged all his affairs and then he got worse. Paralysis was feared. One of the daughters attending on him, writing to her sister, Mrs. Gambier, said: "I feel very anxious lest the doctors should conclude it to be approaching paralysis, for though he would not suffer pain, how dreadful it would be to such a man." This was on Wednesday; on the Sunday following, which was the last day of October, 1858, he passed away at 6 o'clock in the morning. Happily he was saved from a fate which to "such a man" would have been, indeed, worse than death.

He was buried beside his wife at St. Leonards-on-Sea.

A fanciful but appropriate coincidence is mentioned by the *New York Tribune* in November, 1858, at the conclusion of a long and appreciative obituary notice of Sir William Reid. It is the occurrence during the last fatal illness of the author of *The Law of Storms* of a terrible hurricane in the West Indies and Bermuda.

"We can hardly avoid here noting that the spirit of this statesman and philosopher, who had done so much to illustrate the path of the winds, should pass away, almost, as it were, on the wings of one of the most extensive, rapidly progressing, and destructive ocean hurricanes on record. First coming under notice at the Windward Islands about the 20th of October, it passed over Porto Rico, Hayti and the Bahamas; then, its axis passed, on the 24th, nearly over Bermuda, where its violence was extraordinary; and thence for some days following it pursued its course to the north-eastward, almost, or quite to the shores of Europe. No storm described by either Redfield or Reid seems to have had the enormous diameter of this one. It was severely felt for 700 miles eastward of Bermuda in the same latitude, while its western border grazed New York, affecting the barometer sensibly, and rolling in upon us the extraordinary tides of October 24th and 25th."

The newspapers both at home and abroad, and, especially of those colonies which Sir William had governed, published appreciative obituary notices of him. The London *Times* gave a sketch of his career, from which one or two paragraphs may be quoted. Referring to his connection with the Great Exhibition of 1851, it observed:—

Digitized by Google

"It is not too much to say that the success of the Exhibition, at least in its early stages, and, above all, its punctual opening at the appointed time—contrary to the repeated declaration of the French that it could not, and would not be done—were in a great degree owing to his tranquil energy and determination, which in some instances refused even to yield to the highest influence, to which everyone else had given way. At the close of the Exhibition he was made a K.C.B. and the Government of Malta was conferred upon him, which he administered during the Crimean War; and there were not a few persons here who regretted that he had not the administration of the war itself, nearer to the scene of action.

o o o o o

"He possessed the placid and calm temper of a true philosopher, with a determination to avoid all personal conflicts and disputes—which is sometimes not an accompaniment of philosophy—combined with a rare talent for conducting business, and making his colleagues and subordinates do their best. In private life he was one of the most amiable of men with a pleasant mixture of gravity and cheerfulness. . . ."

Having already quoted freely from an article on Sir William Reid and his administration of the Government of Malta, which appeared in a Malta paper at the time of his relinquishing that Government, I will only add in reference to Malta a few words written to Lady Chamberlain, Sir William's daughter, 30 years after his death. They were written by Sir Adrian Dingli, an able exponent of Maltese opinion, in response to a request for information about Sir William during his residence at Malta, for the benefit of Major-General Whitworth Porter, who was then engaged in writing his *History of the Royal Engineers*. After promising to send some notes about the Malta period of Sir William's life Sir Adrian wrote: "Neither you nor General Porter will consider it overpraise to say that, as far as my experience goes—and I have served as the Crown Advocate for Malta under six successive Governors—he was one of the best Governors we ever had, and no one surpassed him in a combination of sagacity, prudence, firmness, and benevolent determination to carry out the duties of his high position."

A Barbados newspaper after giving a brief account of Sir William Reid's career wrote:—

"It is 11 years since he left these shores, but Barbados still feels the impress of his Government, and there are hearts here which still beat in lively remembrance of his own generous and genial warmth. . . . He moved about the country, mixed with the people, saw everything with his own eyes, and by his zeal and example infused into the officers of the Government, into our agricultural operations, into the maintenance and extension of our social and charitable institutions an energy and a vigour to which we had long been strangers, and which greatly helped us, if we are not mistaken, to tide over the gloomy period of 1847–8."

Digitized by Google

The Rev. J. Y. Edghill, in his book *About Barbados: Pen and Ink Sketches of our Governors*, London, 1890, refers to Reid in the following terms:—

"He was a tall, soldierly-looking man—high forehead, expressive countenance, especially for firmness. There never was a Governor here who was more frequently seen abroad. Early in the morning he was in the saddle, and to be found in some part of the town or the rural districts. He visited the public institutions frequently—used his eyes, saw everything for himself, and made acquaintance with men and things in all directions and under all phases. . . . He was a man of few words. His public addresses and messages to the Legislature were brief, but clear and emphatic. He was a great temperance man. . . .

"Our education system was then only in its infancy. Colonel Reid, aided by his excellent wife, liberally assisted the existing schools. They visited them, encouraged the teachers, and helped the poorer children. We have seen them sitting on benches in one of the schools listening to the children as they read, and asking them questions on what they had read. Many a bundle of clothing did they take to the schools, and supply to such children as were declared to be deserving of it.

"His Excellency was a patron of the higher education. He founded the Reid School of Practical Chemistry in Bridgetown. . . . He was eminently practical. He saw at a glance the possibilities of things and worked up to the possibilities. We have said he was a philanthropist. But there was nothing mawkish in his philanthropy. . . . We believe there never was a Governor who left Barbados with more affectionate regard from the whole community. . . ."

It must be remembered that the above was written of a Governor who spent only two years in Barbados and who had not been in close touch with the colony since he left it in 1848. Therefore, for such a tribute to be written 40 years afterwards shows that in Barbados his reputation must have been very firmly established.

In Bermuda, Sir William Reid's first Government, which he left two years earlier than Barbados, he was remembered even more warmly. When the news of his death arrived the signs of mourning were marked. The merchant vessels, American as well as English, in the different ports of the islands hoisted their colours at half-mast. The principal Bermudian newspaper gave expression to the general feeling of the community in the following words:—

"The intelligence of the death of this distinguished officer has been received in this colony with deep and unfeigned regret. As Governor of these islands he left behind him here a name and a reputation which have ever been warmly cherished by all classes. . . . The secret of this sentiment of esteem . . . may be found, we believe, in the conviction which all, whether friendly or hostile to Governor Reid's plans, felt of the perfect sincerity of his efforts to promote the good of the colony. That he was single-hearted in this pursuit none ever doubted,

Digitized by Google

and that his efforts were in general as successful as they were sincere is most unanimously admitted. By his able and conscientious discharge of his high duties, Sir William Reid earned and obtained the approbation of the Crown, and the confidence, nay even the affection, of those whom he governed—a reward not always vouchsafed even to well-intended and well-directed zeal.

o o o o o

"Inflexibly just, rigidly conscientious, and wholly disinterested in his public, as in private, life, Governor Reid possessed many of the faculties which enter into one's ideal of a great and good man. To these generous qualities of the soul were added no small intellectual capacity, and a determined perseverance and industry which would have fitted him for much more conspicuous posts than those which it was his lot to fill.

"As a Governor he was constantly intent on tracing with precision the narrow path of duty, and when he had discovered it, his courage was inflexible and his constancy unconquerable in the pursuit of it. Such men are not always successful, nor even always judicious in the discharge of political functions, but whether from the character of the times, or from that of the people, it must be allowed that Governor Reid's administration of this Government not only was successful at the time, but, in fact, formed an important era in our humble history. His name still continues, and will long continue to be identified with the material prosperity of this colony, which prosperity he developed to an extent not before dreamed of. Nor did his interest in our progress wax cold when his political connection with Bermuda ceased, for long afterwards he evinced a warm desire to promote and stimulate the industry of our people. . . ."

The good people of Bermuda were not content with these comments in the Press. They determined to show their appreciation of Sir William Reid's services to their islands by some permanent memorial, and, in the year following his death, a resolution was passed by the three branches of the Legislature of the Bermudas voting a sum of £300 for the purpose. The resolution ran as follows:—

"Whereas many important public benefits have been conferred on this Colony by His late Excellency, Colonel William Reid, of the Royal Engineers, who was Her Majesty's Governor and Commander-in-Chief of these islands from an early period of the year 1839 nearly to the end of the year 1846, and who, after his departure from Bermuda was appointed to be Her Majesty's Governor of Barbados, and subsequently Her Majesty's Governor of Malta, and was promoted to be Major General in Her Majesty's Army, and was made a Knight Commander of the Bath; And in order to express the gratitude of this community for his valuable public services, it is expedient that some durable Testimonial to his Memory should be provided at the public expense.

"Resolved, that the Receiver-General be, and he hereby is authorized and required to pay, out of any unappropriated moneys in the Public Treasury, a sum not exceeding Three Hundred Pounds, to be at the

Digitized by Google

disposal of His Excellency the Governor, or Officer Administering the Government of these Islands, the President of the Council, and the Speaker of the House of Assembly, for the time being, respectively; and to be applied in obtaining and erecting such permanent memorial of Governor Reid, as they may deem most suitable and appropriate for the purpose contemplated; and that such Memorial may be placed on such spot, either within the Sessions House, or the Public Building containing the Council Chamber, in the town of Hamilton, or in such part of the Grounds adjoining either of those Buildings, as may be selected by the Governor, President, and Speaker for that purpose.

"Passed the Assembly this 11th day of July, 1859.

"By order of the House.

"ALER. EWING, *Speaker.*

"Concurred in by the Legislative Council this 12th day of July, 1859.

"JOHN HARVEY DARRELL,
"*President.*

"Assented to this thirteenth day of July, 1859.

"A. T. HEMPHILL,*
"*Acting Governor.*"

Colonel Hemphill, in his capacity of Acting Governor, forwarded this resolution officially to Lieut.-Colonel E. G. Hallewell, who was at that time Deputy Quartermaster-General at Malta, with a view to its communication to Sir William's surviving relatives. Lieut.-Colonel Hallewell acknowledged the compliment paid to his father-in-law's memory in suitable terms. The Hon. John H. Darrell also wrote to him, as to the form the memorial should take, suggesting either an obelisk with inscription, or a bust. To get a bust would have been a very difficult matter as there was hardly any existing material for an artist to work on. So it was decided to erect an obelisk which could be placed for all the world to see.

The following fragment of a letter about Sir William Reid has been preserved and is worth printing. The writer was Major Colin Mackenzie, R.E., stepson of Mary Fyers (sister of Lieut.-General William Fyers, Colonel Commandant, R.E.). She had married, as his second wife, the Rev. Donald Mackenzie, minister of Fodderty, near Dingwall. His son by his first wife, Major Colin Mackenzie, joined the Corps of Royal Engineers as 2nd Lieutenant in 1813. He served in the Netherlands and France (1814—1816), and in Canada (1838—1839). He was promoted Captain in 1834 and retired in 1842. He was given a Brevet Majority in 1854. He died at Bath in 1870.

* Brevet Colonel A. T. Hemphill, commanding the 26th The Cameronian Regiment of Foot.

Digitized by Google

From Major Colin Mackenzie, R.E., to Lieut.-Colonel Henry Fyers, R.A.

"14, BENNETT STREET, BATH, *1st December*, 1858.

"MY DEAR HENRY FYERS,

"It gave me much pleasure to hear of you and your mother. You will both be to me ever of deep interest.

"My relatives and contemporaries are fast melting away, and one draws close to those remaining who can sympathize with one's antecedents.

"Reid's (departure) is a *great* blank. I agree with you that every incident in a life like his, so thoroughly devoted to his country, should be recorded, not only to frame a life, but as a pattern for posterity.

"In his intercourse with others to impart and to imbibe information, in a spirit of kindness and unostentation, was congenial to him, and in his relations to his younger brother officers, his ruling motive was to lead them to honour and distinction, by stimulating and directing their ambition to an *esprit de corps* and a due appreciation of their vocation; taking advantage of every passing operation in their art, however trivial, to inform them how he had acquired from the accomplished enemy in the Peninsula the best mode of performing it; drawing, from an inexhaustible fund of details he had collected, something new in every conversation; and turning every parade to account by showing his men something new without descending to prolixity.

"His untiring zeal and patient energy with good temper knew no bounds, and, once shown, the operation was repeated until all was perfected. His attribute of firmness was carried by perseverance, but mildness; to be instructed by him was felt by all to be pleasurable. instead of irksome, as is too often the case with officers and soldiers.

"Although often in perilous places and hairbreadth escapes, they were never alluded to, except in the course of conveying his experience in certain operations for the guidance of others.

"The first time I ever met Reid was at the entrance gate of Mons. immediately after the Battle of Waterloo. We (Engineers) were all proceeding to join our divisions in the march to Paris.

"My horses were slight. He told me he trusted to the momentum of a heavy charger and heavy sabre to break through, or cut his way. This he thought equal to, if not an advantage over, an adroit swordsman.

"Thus to the younger officers every word was directed for their benefiting from his great experience in the attack and defence of positions: and having served much with the Light Division it was quite inspiring to hear him." Here the fragment ends.

Reference has already been made to writings by Sir William Reid—some on military subjects—published in 1823, as well as to his great work on *The Law of Storms*, published in 1838. I now add a list, as complete as I have been able to make it, of other publications from his pen.

During the time Reid was on the Unemployed List in 1848 and

Digitized by Google

1849, after his return home from Barbados, he occupied himself with the preparation of an enlarged and revised edition of his book on storm law. Ten years had elapsed since his celebrated work had appeared. The title of the revised and enlarged volume was: *The Progress and Development of the Law of Storms and of the Variable Winds, with a Practical Application of the Subject to Navigation.* 8vo. London, 1849.

In 1850 he conceived the project of publishing the information received from captains and masters of ships in a series of papers. He edited the first number himself, but there it ended. No second number was published. The serial was entitled: *Narratives written by Sea Commanders, Illustrative of the Law of Storms and of its Practical Application to Navigation.* It was published in 1851 in 8vo. size. Probably Reid found himself too much occupied with the work of the Great Exhibition to continue the publication, and his departure for Malta at the end of 1851, and his onerous duties there, prevented him pursuing his meteorological investigations. His correspondence with Mr. William C. Redfield, the American meteorologist, has been already referred to. Reid's letters to this distinguished scientific man have been presented in three folio volumes to the Library of Yale University.

Before concluding my references to Reid's meteorological pursuits, I must mention that a lady disciple very successfully took up the work he was obliged to resign. Janet Taylor, who wrote *An Epitome of Navigation*, published also *A Diurnal Register for Barometers, Sympiesometers, Thermometers, etc.* In the introduction to this *Register* she says:—

"It is only those, who, having witnessed the devastating whirlwind sweeping all before it over earth and sea, and making the stoutest heart to sink with terror, can fully appreciate the untiring research and indefatigable labour of men whose minds have been devoted to so grand an object; that their observations, however, may become more extensively and practically useful, requires the fullest co-operation of all connected with the seafaring profession. Therefore every attention should be paid by masters of vessels to the atmospheric changes in different parts of the world, and all peculiarities during the approach, duration, and track of storms should be carefully registered, and, when opportunity offers, forwarded to those engaged in formulating such information.

"For this purpose Lieut.-Colonel Reid has suggested 'that to all captains of ports, masters of lighthouses, harbour masters, and others, whose professional pursuits naturally lead them to be constant observers of atmospheric phenomena, all information on the subject of storms and variable winds should be forwarded by masters of vessels, who may have encountered any such storms in their voyages, that the observations may be entered in their journals, and forwarded to those appointed by Government to receive them.'"

Digitized by Google

The *Register* ran through many editions; the 6th edition was published in 1852, and was dedicated by the authoress to Sir William Reid, by permission, and the dedication, which has a savour of the 18th century about it, runs as follows:—

"DEAR SIR,

"I am deeply sensible of the honour conferred on this edition of my little work by your kind permission to place it under your distinguished patronage.

"Whatever country has had the good fortune to own your command, will revere your name for the lasting benefits you have conferred on your fellow man; and your own countrymen must ever regard you with feelings of the highest gratitude and admiration for talents which have been particularly devoted to the development of a science, so important to us as a maritime nation. You have taught us to track the wild cyclone in its course, to elude its violence and, when under favouring circumstances, even to make subservient to our purposes its mighty powers.

"All this elevation of mind has not rendered you regardless of the feelings of others less gifted than yourself, but appears to have given a higher tone to that urbanity of character, by which you are so universally distinguished; and I feel happy in having this opportunity of offering my grateful acknowledgments for your many acts of kindness and consideration towards myself.

"With sentiments of sincere respect I subscribe myself,

"Dear Sir, your obliged and humble servant,

"JANET TAYLOR.

"104, Minories, 1st January, 1852."

Another author, G. Jinman, wrote a meteorological book referring to Sir William Reid's work. The book was published in 1861, entitled *Winds and their Courses, with an Examination of the Circular Theory of Storms, as propounded by Sir William Reid.*

It is a well-known but nevertheless remarkable fact that the busier a man is, the more ready will he be to respond to any outside call upon his time. So it was with Reid. He was always ready at the call of the editor of the *Corps Professional Papers* to write papers for the benefit of his brother officers, and when the *Corps Professional Papers* were first started in 1837 he contributed no less than seven papers to the 1st Volume.

The following is a list of the papers showing the subjects which engaged his attention:—

Professional Papers of the Corps of Royal Engineers.

Vol. I., 1837.

1. "On Assaults."
2. "Forts of Salamanca and Fortress of Burgos."
3. "Account of the Attack of Fort Laredo, near Santoña."
4. "Description of the Concrete Sea Wall at Brighton, and the Groynes which Defend the Foot of It."

Digitized by Google

5. "A Short Account of the Failure of a Part of the Brighton Chain Pier in the Gale of 30 Nov., 1836."

6. "Hints for the Compilation of an Aide-Mémoire for the Corps of Royal Engineers."

7. "On the Destruction of Stone Bridges."

Vol. II., 1838.

1. "On Entrenchments as Supports in Battle, and on the Necessity of Completing the Military Organization of the Royal Engineers."

2. "Further Observations on the Moving of the Shingle of the Beach along the Coast."

3. "On Hurricanes."

Vol. III., 1839.

1. "On the Decomposition of Metallic Iron in Salt Water, and of its Reconstruction in a Mineral Form."

Vol. IV., 1840.

1. "On Lodging Troops in Fortresses at their Alarm Posts."

Vol. X., 1849.

1. "Properties in Cultivation in St. Lucia."

Before completing this memoir by giving particulars of Sir William Reid's descendants, it seems desirable to examine the imprint which his character—derived from the story of his life and from the records of contemporary opinion—makes upon us.

From the very beginning of his active service as a subaltern in the Peninsula down to his last service in the Government of Malta, Reid seems to have impressed himself personally on all with whom he came in contact.

In war his activity, energy, pluck, and devotion to duty, amounting almost to enthusiasm, won him the recognition and cordial regard no less of his comrades than of his commanders. The extraordinary complication of circumstances, by which the rewards that were his due were denied him when he came home, must have been a serious trial to a young man fresh from the triumphs of the field and the approval of his Generals. The sense of justice, so strong in him, rebelled, and might even have wrecked his life, had not his openness to reason and natural persistency combined stood him in stead. His uncle and godfather, General William Fyers, was a true friend at this crisis of his life, and the struggle Reid then passed through cannot but have strengthened his character. His determination to be patient but not to allow himself to be snuffed out, enabled him to carry the point about which he was so sensitive, and to secure the hall-mark of brevet rank for service in the field, on which he had set his heart, as the official recognition of his claim.

In his scientific work the same enthusiasm, the same energy, the same persistency carried him through long, laborious and patient

Digitized by Google

investigations, until after many years he achieved a result at once so useful to mankind and so honourable to himself.

And lastly, in high and responsible positions, the qualities recognized by all in contemporary records stand out: the sincerity of the man; his strong sense of justice; his painstaking, personal investigations; his accessibility to all whether high or low; his perception of the limitations of all projects for benefiting the people, and his determination within those limitations to do all that could be done, without fuss and without unnecessary talk. His manner was dignified and no one could venture to take a liberty with him, but there was an innate modesty in him which made him very lovable. He hated all self-advertisement. Seldom has a man occupied three successive Governments, embracing altogether a period of over 16 years, as Sir William Reid did, and yet been so fortunate as to leave behind him in all three an estimation of himself and of his services which can best be summed up in the expressions that have been used:—"He was a great and good man." "He was 'The Good Governor.'"

There is a print of Sir William Reid in the R.E. Mess at Chatham showing him in plain clothes with the riband of the G.C.M.G. It is after a portrait by J. Lane, engraved by Haubart. This print has been reproduced to illustrate my memoir. I regret that a photograph kindly lent me by Colonel Hore which was a copy of a sketch of Sir William in uniform when he was a young man was found to be too faint for reproduction.

By his wife, Sarah Bolland, Sir William Reid had eight children, viz., one son and seven daughters.

I. Frances Reid, born at Brompton Barracks, Chatham, on the 5th August, 1819; died the following February.

II. Lucy Alexandrina Reid, born at Brompton Barracks, Chatham, on the 3rd November, 1820; died unmarried at Woolwich on the 24th October, 1850, and was buried at Charlton.

III. Maria Reid, born at Woolwich, on the 5th December, 1822; married at Barbados, West Indies, on the 17th June, 1847, EDWARD GEORGE HORE (1823—1871), 2nd son of Herbert William Hore of Pole Hore, co. Wexford, Midshipman, H.M.S. *Princess Charlotte*. He served in the Crimea and the Baltic, became Captain, R.N., and was principal Naval Attaché to the British Embassy in Paris, 1860—1871. He died in London on 22nd September, 1871. His wife died in London on the 14th April, 1897. The issue of the marriage was four sons:—

(1). Edward Hore, born 17th November, 1849, at Woolwich; married (1st) Minnie Barrett, by whom he had two daughters, (*a*) Maria Sydney, (*b*) Edith Figi. Married 2ndly Laura Trafford, widow of Henry Trafford Trafford, Captain, Rifle Brigade, and daughter of Percy Barker Pierce, of Southlake Manor, Berks.

Digitized by Google

(2). Gilbert Houston Stewart Hore, born on the 2nd January, 1854, at Malta; died at Gosport, 27th January, 1866.

(3). Henry Reid Hore, born on the 25th January, 1856, at Malta; died of fever on the 13th March, 1894, at Fort Salisbury, South Africa.

(4). CHARLES OWEN HORE, born on the 2nd September, 1860, at Paris. Joined the 38th Foot (South Staffordshire), 11th May, 1878. Served in the *Egyptian Campaign of 1882:* with the Mounted Infantry at Reconnaissance of 5th August, and in actions at El-Magfar, Tel el Mahuta, Mahsameh and Kassassin, Battle of Tel-el-Kebir, forced march to Cairo and occupation of the capital, which surrendered on 15th September, 1882 (medal with clasp, bronze star, 5th Class Medjidie). In *Nile Expedition, 1884-5.* With Mounted Infantry; both actions at Abu Klea; El-Gubat; Metammeh (2 clasps). In *Nile Expedition, 1898.* Attached as Staff Officer to Egyptian Cavalry; Battle of Khartoum, mentioned in despatches, *London Gazette*, 9th December, 1898 (Brevet Lieut.-Colonel, Egyptian Medal with clasp, medal). In *South African War, 1899—1900.* Special Service Officer. Raised, organized and commanded (until 10th July, 1900) the "Protectorate Regiment"; defence of Mafeking, including actions of 26th December, 1899, and 12th May, 1900; operations in the Transvaal, west of Pretoria, July to 29th November, 1900, including actions at Elands River (4th to 16th August). Mentioned in despatches, *London Gazette*, 8th February, 1901 (Queen's Medal and 3 clasps, C.M.G.). He was Adjutant of the 2nd South Staffordshire, 1892 and 1893; commanded the Mounted Infantry in Egypt, 1894 to 1899; commanded "Protectorate Regiment," 1899 to 1900; commanded 2nd Royal Garrison Regiment at Gibraltar, 1901 to 1905. He married at Leamington, on 23rd January, 1889, Dulcibella Eden Radcliffe, daughter of General Travis Radcliffe, by Mary, his wife, daughter of General Cumberlege, Madras Cavalry, and by her has issue:—

A daughter, Kathleen Dulcibella Hore, born at The Curragh, co. Kildare, on the 15th February, 1890. She married at Chelsea, on the 14th October, 1908, HENRY RICHARDSON PECK, Brevet Major, Royal Horse Artillery, son of the late P. W. R. Peck, of Templecome House, Somersetshire, and of Mrs. Peck, of Maidencombe House, St. Mary Church, S. Devon.

Digitized by Google

IV. Sophia Lonsdale Reid, born at Brompton, Chatham, on the 9th January, 1824; married at Bermuda, on the 11th May, 1843, EDMUND GILLING HALLEWELL, 20th Foot, born in 1821, eldest son of Edward Gilling Hallewell (d. 1881), M.P. for Newry, by his wife, daughter and heiress of Joseph Watts, of Stratford House, Gloucester. Hallewell served on his father-in-law's Staff as a Captain in Malta until the *Crimean War* of 1854–55, when he was Deputy Assistant Quartermaster-General to the Light Division. He took part in the Battles of Alma and Inkerman, and in the Siege of Sebastopol (medal and 3 clasps, brevets of Major and Lieut.-Colonel, Legion of Honour, 5th Class Medjidie, and Turkish Medal. Returned afterwards to Malta as Deputy Quartermaster-General. In 1864 Colonel Hallewell was appointed Commandant of the Royal Military College at Sandhurst, and died while holding that appointment in May, 1869. Besides two children who died in infancy he had three children, two sons and a daughter, viz. :—

(1). Edmund Hallewell, born at Kingston, Canada West, on the 22nd January, 1849. Died without issue at Southsea.

(2). HENRY LONSDALE HALLEWELL, born near Stroud, on the 3rd October, 1852; joined the Royal Scots Regiment, did good service in India during the Bengal Famine in 1874, and was mentioned in despatches. He was a Deputy Assistant Adjutant-General at Headquarters, London, from 1881 to 1886, and was sent as a Special Service Officer to join Sir Gerald Graham in the Suakin Campaign of 1884; he served as a transport officer (medal with clasp and bronze star). He served also in the Nile Expedition of 1884–5 under Lord Wolseley, but was invalided home on account of sunstroke (additional clasp). From 1886 to 1891 he served with his regiment in South Africa and took part in the operations in Zululand. He retired from the Army in 1892. He served in the Boer War as 2nd in command of the Queenstown (Cape Colony) Rifle Volunteers; he was mentioned in despatches and made a C.M.G. for his defence of Helpmakaar (medal and 2 clasps). On his return home he volunteered for service at the Royal Scots Depôt, Glencorse, N.B. He was promoted Brevet Lieut.-Colonel for his services. He married (1st), in 1876, Charlotte Caroline Peareth, daughter of William Peareth, of Usworth, co. Durham. She died in 1879, having had issue :

(*a*) A daughter, Charlotte Caroline Hallewell, who married, in 1902, Maurice William Skene-Tytler, of Keith Marischal, Pencaitland, East Lothian.

Digitized by Google

Lieut.-Colonel H. L. Hallewell married (2nd), in 1881, Emily Jane Fraser-Tytler, 3rd daughter of James Stewart Fraser-Tytler, of Woodhouslee, Midlothian, by whom he had issue two children :—

(*b*) Alice Margaret Hallewell, married, in 1910, Christopher Elphinstone Seton, Barrister-at-Law.

(*c*) EDMUND GILLING HALLEWELL, born at Cape Town in 1887, late Midshipman, R.N., who married, in 1909, Dorothy Margaret Lennox Jepherson, daughter of A. Jepherson, by his wife, Georgina Peareth, and granddaughter of Mrs. Peareth Lennox, of Lennox Castle, Stirlingshire. There is a son of this marriage, John Lennox Hallewell, born in 1910.

Lieut.-Colonel H. L. Hallewell died at Bentley, Farnham, on the 23rd June, 1908.

(3). Sophia Lonsdale Martha Hallewell, born at Malta on the 15th November, 1858. Died unmarried.

V. Edmund Hay Reid, born at Mountjoy, Phœnix Park, Dublin, in 1825, and died in the following year.

VI. Elizabeth Oakley Reid, born at Mountjoy, Phœnix Park, Dublin, on the 5th November, 1827 ; married at Cheltenham, on the 16th January, 1849, the Rev. Charles Gore Gambier Gambier, M.A., Oxon. (1824—1891), of the Toft, Sharnbrook, Bedfordshire, son of Admiral Fitzgerald Gambier, and nephew of James, 1st Baron Gambier, Admiral of the Fleet (1765—1817). She died at Bournemouth on 1st December, 1892, having had issue eight children :—

(1). Miriam Gore Gambier, born 10th October, 1852 ; died unmarried 17th December, 1882.

(2). Mabel Lucy Gore Gambier, born in 1854.

(3). Margaret Gore Gambier, born in 1855 ; married, in 1879, James Browning Young, Captain, R.N. Has issue :

(*a*) MAURICE JAMES DUKE YOUNG, born 8th September, 1880, Captain, The Devon Regiment ; married, in 1909, Margery Pain, daughter of the late Colonel Pain.

(*b*) Cicely Margaret Young, born in 1882.

(*c*) MARTIN YOUNG, born in 1884, York and Lancaster Regiment. Deceased.

(4). Mary Grace Gore Gambier, born in 1856 ; married, in December, 1892, Henry Brough Stanwell, M.A., Cambridge.

(5). Elizabeth Caroline Gore Gambier, born in 1857.

(6). Sarah Caroline Gore Gambier, born in 1859 ; married, on 2nd July, 1891, Cuthbert Eden Heath, of Ainstie Grange, Dorking, and of Lloyds, E.C., son of Admiral Sir Leopold Heath, K.C.B., and has issue :

(*a*) Leopold Cuthbert Heath, born 28th May, 1894.

(*b*) Genesta Mary, born in 1899.

Digitized by Google

(7). Robert Gore Gambier, born in 1860; died in 1893.

(8). Michael Seymour Gore Gambier, born in 1861; married at Netley Marsh, Hants, on the 19th August, 1903, Irene Marion Bentley, daughter of Arthur Francis Bentley, of Woodlands, Totton, Hants, and has issue:

(*a*) Robert Michael Gore Gambier, born in 1904.

(*b*) Paul Bentley Gore Gambier, born in 1907.

VII. Charlotte Cuyler Reid, born at Brighton on the 21st November, 1835; married, on the 26th June, 1873, Field Marshal Sir Neville Bowles Chamberlain, G.C.B., etc., etc., the distinguished Indian commander whose life has lately been published. Lady Chamberlain died without issue at Lordswood, Southampton, on the 26th December, 1896. The Field Marshal died at the same place on the 18th February, 1902.

VIII. Grace Reid, born at Portsmouth on the 11th June, 1838; married Capt. Basil Sidmouth de Ros Hall, R.N. (1833—1871), son of Capt. Basil Hall, R.N., the explorer and author, and has issue:—

(1). BASIL WILLIAM REID HALL, born on the 31st October, 1865. Lieutenant, R.N. (*retired*). Served in H.M.S. *Superb* at the bombardment of Alexandria (medal with clasp, bronze star); is Inspector, Royal Lifeboat Institution for the East Coast of England. He married, in 1894, Cecil Mary Ashburnham, daughter of the late John Woodgate Ashburnham.

(2). LIONEL ERSKINE HALL, born 18th July, 1868, formerly Captain, 4th Batt. South Staffordshire Regiment; married, in 1897, Jane Augusta Reynolds, daughter of the late Thomas Leethem Reynolds, and has issue living:

(*a*) Lionel Reid Hall, born 1st February, 1898.

(*b*) Neville Reynolds Hall, born 6th February, 1900.

(*c*) Douglas Basil Hall, born 1st February, 1909.

(3). Helen Sarah Margaret Hall, born on 4th February, 1870; died 25th December, 1881.

Digitized by Google

MEMOIR.

MAJOR-GENERAL EDWARD RENOUARD JAMES, ROYAL ENGINEERS.

(Concluded).

By Col. Robt. H. Vetch, c.b., late R.E.

On returning to military duty on the 1st February, 1859, Lieut. James was appointed to the Ordnance Survey, relieving Capt. R. Stotherd in charge of one of the three divisions at Carlisle; Capt. E. N. Heygate, and Lieut. H. Helsham-Jones, James's comrade in Asia Minor in 1857, were in charge of the other two divisions. On the 1st April the same year James was promoted to be 2nd Captain.

One of his duties on the Survey was the field examination of maps, in order to test their accuracy before they were sent on completion to Southampton for reduction. This duty had a special attraction for James, as it led him on foot through some of the most beautiful scenery of the district. During the 13 years he was employed on the Ordnance Survey he managed to see in a very minute manner a great deal of the charm of English scenery in various parts of the country. He frequently walked as much as 25 miles in one day. Writing of these field examinations in the Carlisle Survey District he says:—

"I did not myself think that the officer's examination on the ground was worth its cost, but the duty was exacted from me, and I did not complain. The charm of beautiful scenery was always irresistible to me, and I retain the most vivid remembrance of each day's walk. In Cumberland and Westmoreland I saw every lake, and ascended Scafell, Skiddaw, Helvellyn and Saddleback. In Northumberland I explored the valley of the Tyne as well as the valleys of the border rivers of the Tweed and the Teviot. . . . In turn I visited every town and place of interest in the northern counties of England and the southern counties of Scotland, remaining six years at Carlisle as my headquarters."

On the 10th July, 1860, Capt. James married, in Carlisle Cathedral, Eleanor Agnes Fawcett, second daughter of John Fawcett of Petterill Bank, Carlisle. A daughter, Eleanor Amie, the only child, was born to them on the 21st January, 1864.

Digitized by Google

In June, 1865, James moved with the whole of his Ordnance Survey Division to Guildford in Surrey. On the 23rd August, 1865, he was promoted to be First Captain. With Guildford as his headquarters he began the tertiary levelling for the south of England in Kent, Surrey, Sussex, Hampshire, Berkshire, and Oxfordshire, visiting all parts of those counties in succession. Besides the levelling he had contouring and detail surveying to superintend.

In addition to his survey work James was frequently called upon to assist in other Government work. A special case occurred after the passing of the Franchise Act of 1866. In the following year a Royal Commission was appointed to enquire into the boundaries of Parliamentary boroughs. The whole of England was divided into districts and two Assistant Commissioners apportioned to each district; these were generally an officer of Royal Engineers and a barrister. Capt. James and a young barrister, Mr. Ralph Palmer, a cousin of Sir Roundell Palmer (afterwards 1st Earl of Selborne), were appointed Assistant Commissioners to conduct enquiries as to the boundaries of the boroughs of Bedford, Peterborough, Huntingdon, Hertford, Cambridge, Marlow, Great Wycombe, Aylesbury, Banbury, Buckingham, Northampton, Woodstock and Oxford. The work occupied the months of August, September, and October, 1867, and James found it both interesting and pleasant, bringing him into acquaintance with many men worth knowing.

Another case was an order from the head office at Southampton to go to Battle Abbey to meet Mr. E. A. Freeman, the historian of the Norman Conquest, and to take his instructions with the view of preparing a plan to illustrate the Battle of Hastings. Mr. Freeman was accompanied by Mr. J. Bryce, author of *The Holy Roman Empire*, now British Ambassador at Washington, and in company of these two James passed a long-remembered day. As they walked over the very scenes of the fighting, Mr. Freeman described the incidents of the battle, showing an intimate acquaintance with his subject and an equal assurance that his conclusions were absolutely correct. The plan, which James made as the result of this visit to Battle, may be found in Vol. III. of *The Norman Conquest*. In the preface to that volume his assistance is gratefully acknowledged by the author, and the Clarendon Press of Oxford University presented James with a copy of the work.*

Another duty he undertook, in common with many officers of the Corps, was the inspection of Science and Art Schools under the Science

* Major-General James made a further study on the ground of the Battle of Hastings on his own account many years later. He then had the assistance of the Hon. F. H. Baring. He came to the conclusion that Freeman's views required considerable modification. He contributed a paper to the *Royal Engineers Journal* of January, 1907, on the subject, with a new plan of the battle.

Digitized by Google

and Art Department of South Kensington. The schools of the whole country were inspected in February and the examinations, which were conducted throughout the month of May of each year, were also visited by these temporary inspectors. On one occasion he inspected the Science and Art Classes at Oxford. He had already made the acquaintance of the chairman of the local Science and Art Committee, Dr. (afterwards Sir) Henry Acland, at the time of the Parliamentary boundary enquiry. On that occasion, during the fortnight the enquiry lasted, he was the guest of the Principal of St. Mary Hall and, dining each day in the Common Room of Oriel, met Dr. Acland, Dean Burgon and other distinguished Oxford men.

On James's arrival in Oxford to inspect the Science and Art Classes Dr. Acland insisted that he should stay over Sunday with him, and on that day took him over to an early dinner with John Ruskin at an old-fashioned inn at Abingdon. James jotted down his recollections of that memorable Sunday, and it is interesting to read his impressions. He says in the notes that he made of the conversation in his diary :—

"I never passed a day in my life more pleasantly, for Ruskin was a perfect host with a remarkable suavity of manner; and though he was a veritable egotist, it would be impossible to forget the musical tone of his voice, and the eloquence of his conversation. In the matter of his discourse I cannot say I found myself in agreement with him. In the first place *I* represented South Kensington, the teaching of which institution was, in his opinion, an absolute crime against Art (with a big A); while *he* was professor of the Slade School at Oxford, which was founded on wholly different principles. Though, doubtless, he was a beautiful artist himself, and one of the greatest critics the world of Art has known, I could not agree with his teaching. He objected to the use of scale and compasses, or to geometrical aid of any kind in design.

"An artist he held was born and not made; the eye and hand of one who had the gift of seeing the beautiful, might be trained by constant observation and long practice, but without this gift of nature in the soul, no amount of mechanical teaching could ever result in good work. South Kensington, he said, had never made an artist, but had spoiled many. He would point to two leaves from a tree or two natural objects of any description, as a proof that Nature abhorred a perfect resemblance between any two things. The mechanical repetition of objects by numbers was, according to his ideas, simply criminal. All this was expressed in most poetical language; in his charming way, which enthralled his listeners.

"On my side of the question, after referring to the miserable national taste which, by general consent, existed in England in the Early Victorian days, I asserted that the undoubted improvement which had been effected in the arts of design and decoration since the Great Exhibition of 1851, had been due, mainly, to the establishment of the Science and Art Department. True canons of line and colour were now taught to

Digitized by Google

artizans, and articles of great beauty for domestic use—such as furniture, wall papers, carpets, iron, brass, woodwork and earthenware, etc., were now made by the thousand pieces, at a cost within the means of all.

"Mr. Ruskin replied that in the palmy days of mediæval art, the artists, who made works of beauty, one of which is valued higher to-day than a whole thousand of mechanically made articles, starved for love of their art.

"The conditions of art production, said I, were certainly very different than they are now, but the single object, beautiful as it might be, was hid amid the cabinets of some king or prince, whereas the multiplied article gives pleasure to the entire nation; and it can scarcely be disputed that the latter, in helping to refine mankind, has benefited humanity infinitely more than the former. And I ventured to say, further, that the great artists—Michael Angelo, Benvenuto Cellini, Albrecht Dürer, and others—did not quite starve; the only difference between their condition, and that of many artists of our day (who do, often, starve), being that they were the paid servants of the Medici and others.

"Mr. Ruskin and I argued the matter all a summer's afternoon, without agreeing. On leaving him, I apologized for the presumption with which a young man had dared to differ from so renowned a critic, and he smiled graciously, as though he thought I should know better when I was older."

Since James parted with his friend Charlie Gordon at Constantinople in 1858, Gordon had been away from England. He had taken part in the war with China and had afterwards distinguished himself, as Commander of the Chinese "Ever-Victorious Army," in the suppression of the Taiping Rebellion. He returned home soon after James had settled at Guildford, and he was appointed Commanding Royal Engineer at Gravesend. As Kent formed part of James's Survey district he put up with his old friend whenever he found himself in that neighbourhood. Of one of these visits he says: "I remember the pride with which he showed me his 'Kings,' as he called his street Arabs, the forerunners of the waifs at the Gordon Boys' Home, and his stopping at a corner to talk with them. Gordon provided liberally for my comfort, but the simplicity of his own life was remarkable."

James sometimes visited a great-uncle, living in Kent, not far from Gravesend, possessor of a famous library. This was the Rector of Swanscombe, George Cecil Renouard, a distinguished Orientalist and a notable linguist, of whom it was said that when a boy at Charterhouse he kept a diary in French, German, Italian and Spanish in turn. He was a Fellow of Sidney Sussex College, and Lord Almoner's Professor of Arabic at Cambridge. He died in 1867, aged 87, bequeathing to James a small legacy, and the family papers, which afforded James pleasant occupation later in life. Another relative in Kent whom he visited was his uncle, the Rev. John

Digitized by Google

Buckner, Vicar of Bapchild, Sittingbourne, who had married his mother's sister. Mr. Buckner's daughter, Augusta, Mrs. Whitehead Gascoyne, also lived at Sittingbourne.

During his stay at Guildford James endeavoured to trace that part of the Pilgrims' Way to Canterbury which runs through West Surrey. After much research and investigations during long walks, he claimed to have done so, and wrote a pamphlet on the subject, which was sold at the Bath and West of England Agricultural Society's Show held at Shalford Park, near Guildford, in 1871. It was entitled *The Pilgrims' Way in West Surrey*. It has been reprinted in an artistic little book, *Three Surrey Churches*. He seems to have traced the route followed by the pilgrims from near Farnham, where they entered West Surrey, to beyond Dorking, where they passed into East Surrey. He showed that many of the ancient fairs owed their origin to the pilgrimage. One of these fairs was held for centuries on what is now Shalford Park, through which the Pilgrims' Way ran. The summer pilgrims, passing by Loseley Park, crossed the Wey near St. Catherine's Chapel to reach Shalford Park, and after the fair, went by the Spital Lane to St. Martha's Hill.

In the course of his investigations James discovered that in two places near the Pilgrims' Way local tradition recorded that John Bunyan had stayed there, and this discovery led him to advance the theory that Bunyan had used the old Pilgrim's Way as a basis for his allegory of the *Pilgrim's Progress*. He considered that St. Martha's Hill exactly fitted Bunyan's description of the "Hill Difficulty," and other points along the "Way" might without violence be accepted as the origin of the Slough of Despond and of the Delectable Mountains. He found a farm on Banstead Downs (lying, as described by Bunyan, not in the "Way" but near it) which bore the name of Doubting or Dowding Castle; and he conceived that the great annual fair held at Shalford might have been the original "Vanity Fair."

It was with great regret that in the spring of 1872, on receiving orders for Malta, James gave up his work on the Ordnance Survey and left Guildford, where he had lived so happily for over six years, where his father and grandfather had lived before him, and where he knew everyone worth knowing for miles round. From the civilians employed under him he received an illuminated address, while another address was presented to him by a deputation of the inhabitants, headed by the Mayor of Guildford, thanking him for all the work he had done and the interest he had taken in the promotion of the establishment of Science and Art Classes in the town.

James arrived at Malta in the middle of May, 1872. On the 5th July following all the First Captains of the Corps were made Majors and James among them. His duties at Malta, where he remained for five years, were of the ordinary kind. In addition to

Digitized by Google

military duties he had charge of the Valetta R.E. Division. He enjoyed the life at Malta, the gaieties of the winter season, the opera, the succession of parties of every description, and he regularly went to the Continent for his two months' leave during the hot weather. In this way he visited Switzerland and the South of France, thoroughly explored Italy, and learnt to speak Italian.

Two incidents of note occurred during James's tour of duty at Malta. The destruction by fire in 1873 of Barry's beautiful Opera House; and the visit of H.R.H. the Prince of Wales (our late King Edward VII.) in 1876 on his return from India. The Prince stayed in the island for some days and Malta was *en fête* all the time. James happened to be Field Officer on duty on the night of the 24th May, 1873, when the Opera House caught fire. It broke out about 10 p.m. just as he was going his rounds. The fire arrangements were as bad as they could be, and although the regiments quartered in Valetta and Floriana were at once summoned and did their best, the water supply was altogether insufficient and the Opera House was gutted. Street fires are almost unknown at Malta and there was no proper fire organization existing. The Opera House was restored in its original form in two years' time.

Colonel Charles George Gordon, who had been appointed to succeed Sir John Stokes as British Commissioner on the Danube in 1871, on his arrival at Galatz in November of that year, wrote a long letter to James and the two friends continued to correspond all the time James was at Malta. Thirteen letters in all have been preserved, three from Turkey, nine from Egypt and the Soudan, and one from Abyssinia in December, 1879. They were all carefully treasured and docketed by James, who valued them as precious mementos of his old friend, who died the hero of Khartoum. I would gladly have given extracts from these letters but my space is limited as it has been arranged to bring this memoir to a close this month.

James returned home from Malta in the summer of 1877 and, on the expiration of his leave of absence, was ordered to Cork Harbour. He had only been there a short time when his promotion to be Regimental Lieutenant-Colonel necessitated a move. He succeeded Colonel Whitworth Porter as Commanding Royal Engineer of the Dublin District. Colonel T. Murray was then Commanding Royal Engineer in Ireland and later Colonel H. Wray.

In 1880 the services of Lieut.-Colonel James and other officers of Royal Engineers were lent to the Irish Board of Works to enable that Board to cope with the large amount of work thrown upon it by the Relief of Distress Act. The Chairman of the Irish Board of Works was Colonel (afterwards Sir) J. G. McKerlie, R.E., and the principal work at first to be done by these special officers was the holding of public enquiries into the applications for loans for public works from the districts in which it was alleged that distress existed.

Digitized by Google

The duty entailed a great deal of travelling about certain parts of the island; it enabled James to see for himself what the state of the country was and led him to ponder over the complex circumstances which had induced such a condition of affairs, with the result that he was a determined opponent of Home Rule for Ireland.

In January, 1881, James resumed his military duties as Commanding Royal Engineer of the Dublin District and was very busy visiting all the stations in it. The district occupied, roughly speaking, the whole central part of Ireland from St. George's Channel to the Atlantic Ocean. He was promoted to be Brevet Colonel on the 1st October, 1881. On the 10th April, 1882, Mrs. James died after a lingering and painful illness.

On the 1st October in this year James completed his five years as a Regimental Lieutenant-Colonel and had consequently to leave the Corps. He found that practically if he went on half-pay there was little chance of military employment, and as he was one of the favoured officers who were given compensation for loss of prospects on account of the changes which took place in 1877, he elected to retire on an annuity of £600 a year with the honorary rank of Major-General. He was then only 49 years of age.

James was offered and accepted the appointment of an Assistant Commissioner to the Irish Board of Works. There is no doubt he anticipated a successful career in the Civil Service of the Crown and looked forward to perhaps another 16 years in that service and to a day when he would succeed Colonel McKerlie as Chairman of the Board. As it was his salary was fixed at £800, but while he was so employed he could not draw his military pension. He was therefore agreeing to work in a very responsible and heavily laden office for £200 a year. He was charged with the organization and administration of Section 31 of the Land Law Act of 1881, which provided for the first time the granting of direct loans to tenants for the improvement of their holdings.

The Board of Works was composed of Colonel McKerlie (Chairman) and two other Commissioners; Mr. William Lefanu, a sportsman and the author of the delightful volume of recollections entitled *Irish Wit and Humour*, and Mr. Ussher Roberts, a well-known hunting man and authority on horse flesh. James had chiefly to do with Mr. Lefanu, who lived at Bray. They became quite intimate and James made the acquaintance of other well-known wits—Father Healy of Bray and Judges Lawson and Murphy. James was given a free hand and instructed to frame the procedure of his office *ab initio*. The loans previously made for land improvements had been to landlords only, and the department of the Board charged with their administration was separate and distinct from that over which James presided. James was tentatively given four inspectors, one for each province. Two of these were officers of Royal Engineers, Lieuts.

Digitized by Google

H. E. Rawson and N. M. Lake, now both Colonels on the Retired List and well known for the good work they have done in the Service. The number of loans, however, increased so rapidly that the inspectors had to be multiplied to keep pace until there were 36 of them.

James thoroughly enjoyed the travelling about the country and seeing new places which his office entailed. His delight in beautiful scenery was not quenched, even when it had to be exercised at the cost of putting up at the wretched inns of Irish villages of 25 years ago. In the course of his duties he had learned to know the south of Scotland and the greater part of England very well, and since he had been in Ireland he had seen a good deal of the island. But his employment as Assistant Commissioner now led him into every corner of it. His only regret was that being always on duty the gratification of his passion for scenery had to be made a matter of second importance and he had to content himself with a cursory glance when he would have devoted gladly many hours.

After he had been nearly three years an Assistant Commissioner of the Irish Board of Works, the administrations of loans to landlords was transferred to his department, greatly increasing his work ; but it was a tribute to the efficiency of the organization he had devised for the administration of loans to tenants that the same system was directed to be adopted for loans to landlords in substitution for the method previously in force. The retirement of Colonel McKerlie, the Chairman of the Board of Works, had already taken place and the successor appointed to this office was the late Major-General Sir Richard Sankey of the Indian Engineers. James saw no hope of preferment and nothing but an increase of salary on account of the extra work thrown upon him would induce him to remain under the Board. The increase of salary was strongly recommended by the Castle authorities, but the Treasury refused to grant it and James resigned. It seems to have been a short-sighted policy on the part of the Treasury from a financial point of view, as provision had to be made for James to draw his pension of £600 a year on the Army Estimates while his successor drew the salary of the relinquished post on the Irish Estimates, costing the country a good deal more than the retention of Major-General James's services would have done.

Of the many regiments which James had met in the course of his service in the Crimea, in Malta, and in Ireland, none interested him more than the 1st Royal Dragoons which was stationed in Dublin while he was Commanding Royal Engineer of the Dublin District and was at the time commanded by Colonel (now Major-General) Frank Russell. It so happened that in 1880 there had been a discussion in the *Royal Engineers Journal* on the *Memoirs of Capt. George Carleton* (see numbers for May, June, October and November of that year). Carleton's Memoirs treated of the War of Succession in Spain and

Digitized by Google

General James wrote to the editor that he was in possession of an old MS. journal, kept by an ancestor, who served in the Royal Dragoons during that war, and asked whether, if he deciphered and transcribed it, it would be accepted for the *Royal Engineers Journal*. This *Journal of Colonel de St. Pierre of the Royal Dragoons in the War of the Spanish Succession, 1703—1713*, duly appeared in the *Royal Engineers Journal*, beginning in Vol. XI., No. 132, November, 1881, and ending in May, 1882. It was afterwards issued as a pamphlet of 82 pages and 3 maps in 1882.

Colonel de St. Pierre's Journal contained an account of the movements of the Royal Dragoons with lists of the officers serving in the regiment during the period to which it referred. His narrative corroborated that of Carleton, which made it doubly valuable in a literary sense. It came into James's possession with the family papers left him by his great-uncle, the Rev. George Cecil Renouard, Rector of Swanscombe, to whom reference has already been made. It was not until James was in Dublin that opportunity had offered to examine these papers.

Until James deciphered it in 1880 the existence and purport of the MS. had not apparently been known even to his own family. James says of his ancestor: "Colonel Jacques de St. Pierre married Marie Renouard; their daughter Elizabeth became the wife of the Rev. John Henry Ott, and was the mother of Mary Ott, born in 1732; Pierre Renouard, brother-in-law of Colonel Jacques de St. Pierre, was an officer in the same regiment, and his son Peter Renouard married Mary Ott, his first cousin once removed. The daughter of this marriage was my grandmother, Mrs. John James."

This Pierre Renouard of the Royal Dragoons served in Spain with the regiment and as Aide-de-Camp to the Earl of Peterborough as well as to the Arch Duke Charles. So that his brother-in-law, Jacques de St. Pierre, no doubt derived his information from the best sources. Both General Ainslie, the Colonel of the Regiment, and Colonel Frank Russell, the Lieut.-Colonel in Command, sent James warm acknowledgments when he presented them each with a copy of the pamphlet, expressing their sense of its value to the regiment. It was quite new to them and was the most important addition to the Regimental Records that had been received for many a day, as, in fact, it gave unknown history of a century earlier than was then included. Colonel Frank Russell published, in 1887, a *Memoir of the Earl of Peterborough* and mentioned in the preface that the idea of writing it was first suggested to him by the *Journal of Colonel Jacques de St. Pierre*.

After leaving the Irish Board of Works in August, 1885, James travelled on the Continent and spent the winter in London. In 1886 he went to reside at Merrow, Guildford, and remained there until 1890. Then for a whole year he travelled through Belgium,

Digitized by Google

Germany, Austria, Servia, Turkey, the Crimea and Asia Minor, visiting Malta, Tunis, and Algeria on his return journey.

On the 28th July, 1891, he married at Brighton, as his second wife, Charlotte Sophia Mary Penrose Coode, only child of the late Major Penrose Coode, Royal Marine Light Infantry, and grand-daughter of the late Admiral Sir John Coode, K.C.B. He then settled in London, first at Oxford and Cambridge Mansions, and later at Nevern Mansions, Earl's Court.

In 1891 General James's aunt, Miss Annabella James, died, and he came into possession of many books, manuscripts, portraits, miniatures, and other family relics. He always stayed at home in the morning and spent a great deal of his time in arranging these papers, in compiling pedigrees and histories of his ancestors and his own autobiography in many typewritten and illustrated volumes. In 1898 he printed a volume entitled *The James Family* for private circulation.

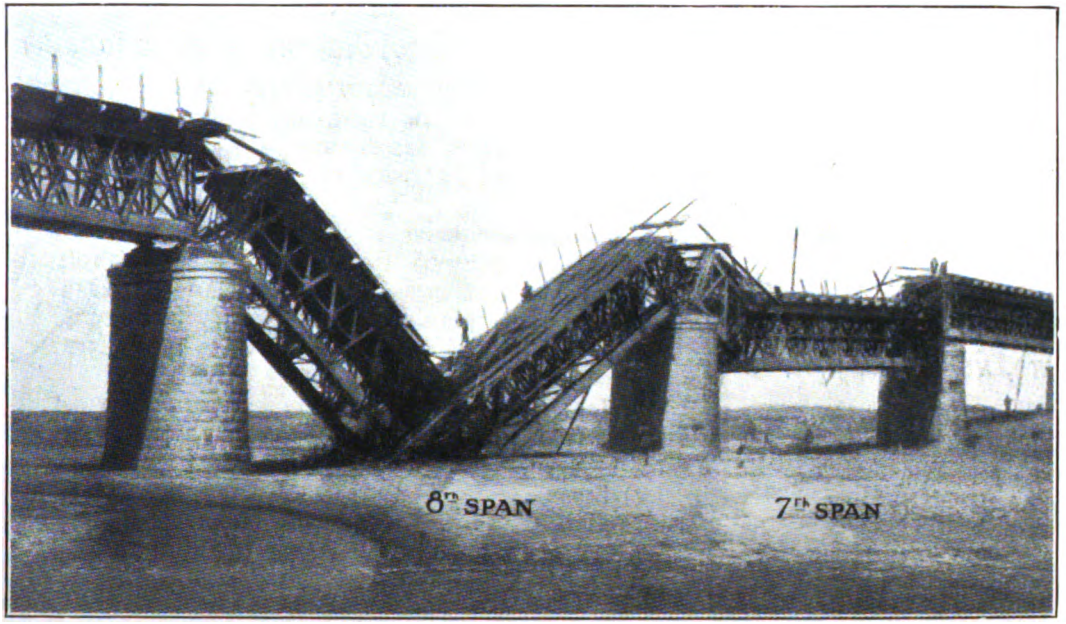
He was a member of the Army and Navy Club from 1856. He was elected a Fellow of the Huguenot Society of London in 1899. He was also a member of the Russian Society and read a paper on his Russian travels. He was a very regular attendant at the Corps Meetings and dinners and kept up his interest in Corps matters, serving on the Institute Council and contributing to the *Royal Engineers Journal.*

He died after a short illness at his flat in Nevern Mansions on the 14th October, 1909, and was buried in Brompton Cemetery on the 16th October. His wife was very ill at the time of his death. She died on the 29th November following and was buried beside him. Major-General James's only child, Miss Eleanor Amie James, survives him.

Digitized by Google

Digitized by Google

DEMOLITION OF THE HUN-HO RAILWAY BRIDGE, 10th MARCH, 1905.



Digitized by Google

TRANSCRIPT.

THE DEMOLITION OF THE HUN-HO RAILWAY BRIDGE.

Précis of an account by Capt. Zavadski, 4th Railway Battalion, published in the *Razvyedchik*, No. 1023, 1910.

VARIOUS contradictory accounts of the demolition of the Hun-Ho railway bridge have been circulated. The following is a description of what actually took place.

On the 9th March, 1905, I was detailed with my mounted sapper detachment of the 1st Siberian Army Corps, by the Chief of the Traffic Section of the Commander-in-Chief's Staff, to demolish the railway bridge which crosses the Hun-Ho River 4½ miles south of Mukden. Lieut.-Colonel Kolobov, commanding the 2nd Trans-Amur Railway Battalion, was ordered to superintend the operation.

About 8 p.m. on the 9th March, I reported myself to Lieut.-Colonel Kolobov. I had with me 1st Class Conductor Chebotarev and a senior non-commissioned officer of the 1st East Siberian Sapper Battalion. Colonel Kolobov pointed out on a sketch the proper place for laying charges of pyroxylin, on a cross section of a girder. The bridge consisted of 22 bays, with girders each 135′ long. It was impossible to demolish the piers of the bridge, because no mine recesses existed and it would have taken too long to construct them.

Colonel Kolobov ordered me to proceed with my detachment at once to the bridge, and wait there until he arrived in a trolly. I reached the bridge about 9 p.m. After I had been there for about half an hour, Lieut. Terletski, attached to the 5th East Siberian Sapper Battalion came up with three men. He told me that he had been sent by the Officer Commanding Engineers, 5th Siberian Army Corps, to demolish the bridge. I told him that I was waiting for Colonel Kolobov who was to superintend the operation. The latter arrived with two officers and some men of the Trans-Amur Railway Brigade, in two trollies, about 10 p.m. He ordered us to remove the flooring and also the rails over the 8th and 10th spans; I was ordered to prepare the 8th span for demolition and Lieut. Terletski the 10th span from the northern end of the bridge. I set my party (3 non-commissioned officers and 3 men) to work upon the 8th span, and Lieut. Terletski with his three men went off to the 10th span.

At 3 o'clock in the morning, Colonel Kolobov told me that he had to return to Mukden, and went off with his staff in his trolly. He ordered me to wait, when I had finished my own work on the 8th girder, until Lieut. Terletski was ready with the 10th.

About 5 a.m. on 10th March my 8th girder was ready; all six charges

Digitized by Google

were attached in position with Bickford fuzes, joined together at the two ends, on both sides of the girder. Lieut. Mennik, of the 17th Sapper Battalion, then arrived with three men and told me that he had been ordered to demolish the bridge. As there was little time available for preparing an explosion along the cross section of the girder, and the Japanese might appear at any moment, he decided to blow up the 7th girder by placing two cases of pyroxylin on the ends of the upper members of the girders close to the point where the girder rests on the stone pier. His work was soon finished, and he and I both waited over two hours for the work on the 10th girder to be finished.

At 8 a.m. an officer of the Ural Cossack Regiment came up with a patrol and warned us to make haste in blowing up the bridge, as his patrol would be the last to cross it, while the Japanese might arrive at any moment from Fuliu to the eastward where they had forded the river. I went to Lieut. Terletski and asked him when he would finish his work, told him that I should blow up my own bay as soon as any Japanese appeared, and begged him to hurry up.

At 9 a.m. he at last said that he was ready. Cables were then run from the 10th and 7th girders to the northern end of the bridge, and Bickford fuzes from the 8th girder were lighted, on my order, by my two senior non-commissioned officers.

I watched the results of the explosion from close to the end of the bridge. The first explosion was that of the 7th span which was fired electrically. There was a yellow column of dust, and the far end of the girder, which bent at the point of the explosion, slipped from the pier. Four minutes later, the six charges placed by my own men in the 8th span blew up almost simultaneously. The centre of the girder was cut through and the two broken ends fell to the ground in the middle of the span. The charge affixed to the 10th girder by Lieut. Terletski did not explode at all.

Having successfully accomplished our work, I took my party at a trot to Mukden station, where my Sapper Company (180 men, of the 1st Siberian Army Corps) had meanwhile made all necessary preparations for setting fire to the adjacent stores and magazines. After ordering these to be set alight I withdrew my force and left the N.E. side of Mukden about 11 a.m. and, after passing various troops halted on the crowded road, we reached the main Mandarin Road. Near the village of Tava, the Japanese surrounded our troops and opened artillery fire upon them. I managed to get my party through, together with our transport. During our further retreat northwards, we were under Japanese artillery fire for some 10 miles, and my force lost 2 men killed and 3 wounded.

I am indebted to the Russian Military Attaché in Japan for the following statement received from the Japanese General Staff as to the conditions in which the bridge was found by the Japanese.

"The bridge had been demolished on the 10th March, 1905, by the Russians. Its appearance is shown by the photograph annexed. As it was impossible to repair the bridge within any reasonably short time a temporary bridge was constructed with great difficulty further up the river, over which rails were laid . . . ."

Digitized by Google

NOTICES OF MAGAZINES.

Revue Militaire des Armées Étrangères.

August, 1910.

Military News of Different Countries.—*Austria.*—Capt. Frederick Boemches of the 5th Battalion of Austrian Pioneers has recently invented a dirigible. Its capacity is 2,750 cubic metres, and its length 57 metres. It is divided into four compartments each of which has its own safety valve and ballonet, the object of this arrangement being to avoid catastrophes similar to those of the "République." In the foremost of its two cars is the machinery, and in it travel two mechanics and the pilot. In the rear car is room for four passengers. The engines consist of two 36-H.P. twin cylinder motors; the diameter of the two propellers is 34 metres, and the maximum speed attained 55 kilometres per hour. Official trials are to take place in the autumn.

A knowledge of shorthand is now necessary for admission to the Austrian Staff College.

Belgium.—Reorganization of the Artillery.—The new organization of the artillery is as follows:—Field Artillery.—Consists of 4 brigades of 2 regiments each. A regiment is composed of headquarters, 6 batteries, organized in two groups of 3 batteries, and in the case of odd-numbered regiments, 2 reserve batteries and a depôt; in the case of even-numbered regiments, 1 reserve battery and an ammunition column. The strength of the battery is 84 men and 47 horses. Horse Artillery.—Two groups of 2 batteries each. The strength of a battery is 109 men, and 59 riding and 38 draught horses. All the batteries have 6 guns.

Italy.—A special grant of 10 million francs has been voted by the Italian Parliament for the year 1909—1910 to pay for:—(1). The construction of dirigibles, aeroplanes, hangars and other necessary accessories. (2). To cover the expenses involved by sending officers on tour to examine other balloon installations, on free runs, etc.

Japan.—1,200,000 francs have been voted for aeronautical experiments, part of which is to be devoted to the purchase of a suitable ground to carry out the experiments on. The army and navy both contribute officers to this experimental work.

Roumania.—The army is being reorganized, and the following is its new organization:—Infantry.—Consists of 36 regiments each of 3 battalions and 1 depôt company. There are 4 companies in each infantry or rifle battalion. Cavalry.—Each regiment consists of 4 squadrons and 1 depôt. 6 machine gun sections of 2 guns apiece

Digitized by Google

have been allotted to the cavalry. Artillery.—18 regiments arranged in 9 brigades of 4 batteries, a "cadre" battery, and in some cases a howitzer and 3 depôt batteries compose a regiment. Pioneers.—6 battalions (5 field and 1 fortress) each consisting of 3 companies and a reserve section. Troops of Communication.—1 pioneer and 1 railway battalion of 4 companies each and 1 depôt company. There is also a specialist company for wireless telegraphy, searchlights, motor cars, carrier pigeons, and a section of airmen.

A. H. SCOTT.

RIVISTA DI ARTIGLIERIA E GENIO.

July—August, 1910.

THE WORK OF THE RUSSIAN SAPPERS AT THE DEFENCE OF PORT ARTHUR.—The *Mitteilungen über Gegenstände des Artillerie-und Geniewesens* publishes a recent account by Capt. W. Iakowlew of the works executed by the Russian sappers during the defence of Port Arthur.

This article published at the end of last year in the *Ingenernij Journal* contains notes of much importance which the author has collected from official sources during the campaign.

At the time of the investment (30th July, 1904) the following technical troops formed part of the garrison of Port Arthur:—1 company of sappers, of 420 men; 1 company of fortress miners, of 206 men; 1 company for railways, 340 men; 1 detachment of telegraphists, 88 men. During the investment the work of the sap and the underground mines was executed by the sappers and railway men.

The lines of defence of the fortress, as regards technical works, were divided into six sections, to each of which a superior officer of engineers was appointed. The men of the sapper company were distributed among the various works of the fortress.

As is known, the principal lines of defence of Port Arthur extended for about 23 k.m. comprising six permanent forts, five provisional works, five batteries distinguished by the letters A, B, D, G and W, and some redoubts and field entrenchments.

Port Arthur had three fronts of land defences; the eastern front from the Bay of Tach up to the Lunch Valley; the front along the Lunch Valley; and the west front from the Lunch Valley to the Bay of Iaaben.

On the eastern front—about 8 k.m.—on which the Japanese made their principal attack, there were the following works:—No. I. Fort, Batteries A and B, Forts Nos. II. and III., and the work *e*. In the intervals between these works, field redoubts, batteries and trenches were constructed. On the other side between Forts II. and III. there were two old Chinese works with high ramparts, without ditches, one of a pentagonal trace, and the other with four sides. These works were in a ruinous state and had to be reconstructed by the Russians and were numbered 1 and 2. Redoubt No. 1 was particularly efficient as a support on the

Digitized by Google

right of Fort III. In rear of No. 2 there were two batteries, one called the rear battery with 3 guns of 15 c.m., and the other with 4 mortars of 23 c.m. Behind the Redoubt No. 1 there was the battery called the Eagle's Nest.

On the 19th August the Japanese had captured the ground in front of Daguschan, Sjaoguschan and Echberg. On the same day they commenced the bombardment on the eastern front and especially of the interval between Forts II. and III. On the evening of the following day the Japanese were massed in the spaces of ground before Nos. 1 and 2.

On the morning of the 21st August they commenced a series of attacks against Redoubts 1 and 2. Notwithstanding the obstinate defence of the Russians the redoubts fell into the hands of the Japanese on the evening of the 22nd August.

On the night of the 23rd—24th August the Japanese renewed their attack on the eastern front. Although received with an intense fire by the Russians, they succeeded in gaining a portion of the wall which had been ruined by the bombardment near to its bifurcation towards Redoubt No. 1.

From this point the Japanese again advanced to the attack of the rear battery and the Eagle's Nest, but were repulsed with enormous losses in a counter-attack by the Russians from the Chinese walls. In the small space of about 400 m. between the Chinese walls and the rear battery about 2,500 Japanese corpses were counted on the following night. This place was called "the valley of death" in consequence.

The Russians having failed to recapture the lost redoubts, the commandant of the fortress gave orders to proceed against the middle ones by methodical attack by sap and mine.

On the evening of the 31st August they commenced the approaches against Redoubt No. 1, but the work had to be stopped owing to the insupportable stench from the Japanese corpses which rendered the work impossible.

On the 10th September, mining work was commenced but the work proceeded very slowly. A depth of 3·55 metres was gained. Regular ventilating apparatus not being available, a marine pump had to be used.

On the morning of the 17th September the gallery had only reached 16′ (4·88 m.) in length, and those working in it began to hear the work of the Japanese countermines. The advance of the Russian gallery proceeded up to the 21st September at the rate of 8·5′ (2·60 m.) a day; on the following days owing to frequent alarms, this rate was considerably less, varying from (0·76 to 2·14 m.). The Japanese now constructed approaches, and mounted additional guns.

On the morning of the 5th October, the Russian gallery had gained a length of 42·50 m. and on the 10th October two lateral branches were excavated, in length 2′ on the left and 10′ on the right. At this point the work had to be suspended on account of the ever-increasing density of the rock.

This fatiguing work, lasting for a month and a-half, comprised the construction of about 70 metres of mining galleries; 235 m. of

Digitized by Google

approaches; and 30 traverses; and employed the services of the only company of sappers available at Port Arthur; and a company of railway men who were unable to recapture the redoubt owing to the enforced suspension of work in the mines.

In front of Redoubt No. 1, two mines, Nos. I. and II., were placed at the extremities of two lateral branches, and a third, No. III., in the gallery at two-thirds of its length from the entrance. The charges were calculated at the following proportions:—No. I., 187·3 lbs.; No. II., 412·5 lbs. and for mine No. III., a charge of 548 lbs.

At the point of the gallery in front of Redoubt No. 2, two charges were placed, one of 720 lbs. and the other 540 lbs. There were besides several groups of fougasses. By the middle of October the mines and the fougasses were ready for explosion. On the 16th October the Japanese captured one of the caponiers, and the second one was captured on the 30th October.

On the night of the 25th—26th November the Japanese after some tentative failures succeeded in destroying one of the obstacles by means of explosives.

On the morning of the 26th November a violent bombardment with shells of 28 c.m. commenced against the Chinese walls, and about midday the Japanese proceeded to the assault. When the first column of about 100 men followed by a second of the same strength, reached the fougasses in front of Redoubt No. 2 they were exploded simultaneously with mines Nos. I. and II. The explosions caused heavy losses among the Japanese, but a fresh assaulting column succeeded in capturing the trenches in less than half an hour. Towards evening they returned to the attack of Redoubt No. 1, and even though the Russians exploded the mines Nos. II. and III., and the group of fougasses No. 1, they finally succeeded in capturing the lunette Kaido.

Of the five mines and the ten groups of fougasses in front of the two redoubts, only two groups of fougasses could not be exploded as they had been damaged by the bombardment. These mines and fougasses caused great losses to the enemy, delaying his advance and at some points compelling him to retire and to change the direction of attack.

EDWARD T. THACKERAY.

Digitized by Google

RECENT PUBLICATIONS OF MILITARY INTEREST.

OCTOBER, 1910.

(*Published Quarterly*).

THE following extracts from the list compiled by the General Staff, War Office, are published in the *R.E. Journal* by permission of the Army Council.

o o o o o

*PART II.**

SECTION I.

FORTIFICATION AND MILITARY ENGINEERING.

PONTOON REGULATIONS (Pontonier Vorschrift), 17th May, 1910. Official. 214 pp., and numerous diagrams in text. 8vo. Berlin, 1910. Mittler. 1s. 6d.

These Regulations supersede those dated September, 1902, and deal with the new pontoon equipment.

The Germans have taken a hint from the British Regulations and have marked the portions of the book which are new with a thick black line in the margin. The most important innovation is the construction of a bridge with half-pontoons.

Pontoons are now classed as "whole" pontoons and "half" pontoons (*Ganz- und Halbpontons*). They are made of galvanized steel. The "whole" pontoons are rounded off at the stern and have a poop at the bow end 0·25 m. (0·72′) high and 1·5 m. (4·2′) long, tapering to nothing towards the stern. They are 8 m. (26·2′) long over all, 1·5 m. (4·2′) broad, with a freeboard of 0·85 m. (2·7′). The weight is about 500 k g. (1,102 lbs.). The half-pontoons are each 4·50 m. (14·7′) long, 1·4 m.(4·5′) broad, with a freeboard of 0·85 m. (2·7′). The weight of a bow end is 300 k.g. (661 lbs.) and of a stern end, 310 k.g. (663 lbs.). The buoyancy of the two half-pontoons put together is the same as that of the "whole" pontoon.

HISTORICAL.

SKETCHES OF MANCHURIAN BATTLEFIELDS. By Major A. I. R. Glasfurd, I.A.

This book of panoramic sketches drawn on the battlefields of Manchuria is a valuable addition to the existing literature on the Russo-Japanese War. The presentment of the ground is accurate and realistic, and the relative values of the various tactical points are graphically demonstrated.

The letterpress accompanying the sketches is simply a statement of such characteristics of the ground as cannot be shown in the pictures.

* The titles of all books are given in English; this does not indicate that the books have been translated. The original title in the language in which a work is written, if not in English, is given in brackets.

Digitized by Google

HOOD'S TEXAS BRIGADE. By J. B. Polley. 347 pp. 8vo. Illustrated. New York and Washington. 1910. The Neale Publishing Co. 16s.

Of the Texas Brigade a Librarian of Congress wrote, "the known statistics of these regiments are so remarkable that if missing figures can be obtained it will establish a record equalled by few, if any, organizations in the Civil War, or indeed in modern warfare," and Hood, its first real commander, says "its signal achievements in the war of secession have never been surpassed in the history of nations." The author, who served as a private in the Fourth Texas, shows that this claim is well founded.

The nucleus of this famous brigade consisted of the First, Fourth, and Fifth Texas regiments of infantry, which at the end of 1861 were formed into a brigade in conjunction with the Eighteenth Georgia regiment under the command of Brigadier-General Wigfall. Early in the following year Wigfall was succeeded in command by Brigadier-General J. B. Hood, who till then had been colonel of the Fourth Texas. Under his command the brigade received its baptism of fire on the 7th May at Eltham's Landing, where it was engaged with part of Franklin's division, but the encounter did not rise above the dignity of a skirmish. After this it was strengthened by the addition of the infantry of Hampton's Legion, but took no active part in the Battle of Seven Pines. In June it was sent with Whiting's brigade to the Shenandoah Valley to reinforce "Stonewall" Jackson. It formed part of his command during the Seven Days' fighting round Richmond, and made its name in the Battle of Gaines' Mill where it was the first to break Porter's lines. The honours of the day were won by the Fourth Texas, which captured 14 guns; and the Fifth Texas distinguished itself by the capture of a whole Federal regiment. The total loss of the brigade in this battle was 128 killed and 428 wounded. The claim advanced 12 years ago that it was Pickett's brigade which captured the Federal artillery is examined and rejected by the author, for reasons which seem entirely convincing.

After the relief of Richmond, Whiting's and the Texas Brigades were restored to Longstreet's command, and formed a division temporarily under Hood's command, who still retained the command of his original brigade. In the Battles of Second Manassas and Sharpsburg the Texas Brigade bore a most distinguished part. The 30th August was the day of the Fifth Texas, which, after almost annihilating its old enemy the Fifth New York Zouaves, "slipped the bridle," pursued the retreating Federals to the Chinn House, and assisted in dislodging them from that strong position. But the lack of a proper brigade commander caused the regiments to become widely separated, and somewhat impaired the efficiency of the brigade as a unit. In the Maryland Campaign the brigade was commanded by Colonel Wofford of the Eighteenth Georgia. The brunt of the fighting on the 17th September was borne by the Fifth Texas, which going into action 226 strong lost 45 killed and 141 wounded, whilst the loss of the whole brigade in that battle was 560 out of 854 men engaged.

On the reorganization of Lee's army in October, 1862, Hood was promoted Major-General and given command of a division composed of the Texas and three other brigades. The Eighteenth Georgia and Hampton's Legion were transferred to other brigades; and in their place the Third Arkansas was attached to the Texas Brigade, which was now placed under the command of Brigadier-General J. B. Robertson, late colonel of the Fifth Texas, but it continued to be known throughout the war by the name of Hood's Texans. It took no active part at Fredericksburg, and missed Chancellorsville. In the Gettysburg campaign it was heavily engaged on the second day in the historic struggle in Devil's Den, and lost 87 killed and 329 wounded. Though no great admirer of Longstreet, the author is plainly disposed to acquit him of the charge of having caused the loss of the battle. He takes the view that Lee's plan of attack was not made known to Longstreet till nearly noon of the 2nd July, owing to the delay of the officers sent by Lee at daybreak to reconnoitre the ground, for whose report he was impatiently waiting: that Longstreet's movement was delayed, not owing to the Corps Commander waiting for the arrival of Law's brigade, but because Anderson's division of the Third Corps did not get into position till 1 p.m., and it was not till this division was in line of battle that Lee sent General Pendleton to conduct Longstreet's command to its position. "Of whatever needless delay, slow and deliberate movement, and unwillingness to give battle General Longstreet may be accused and may have been guilty, there was yet abundance

Digitized by Google

of time after the divisions of Hood and McLaws went into action, in which, by united effort, to drive the Union Army from its stronghold and put it to rout.'

In September, 1863, Hood's division was sent to reinforce Bragg in Tennessee, and took part in the Battle of Chickamanga. The author makes some interesting observations about the difference in fighting methods between the armies of the West and East. Both Rosecrans' and Bragg's armies were accustomed to "stand up and fire" and "lie down and shoot" fights, but were unaccustomed to "the wild charges so common in Virginia." The brigade was next engaged on the 20th October in the night attack made by Hood's division, now under General Jenkins' command, upon Hooker's force at Wanhatchie. The Texans resented the appointment of Jenkins over the head of Law; and the veteran troops of the division were unwilling to engage in a night attack. Of the Texas Brigade only the Fourth Texas was in the firing line, and its headlong stampede from Raccoon Mountain is humorously described by one of the participants. When Longstreet was given discretionary authority in December over all the Confederate forces in East Tennessee, he seized the opportunity to rid himself of some of his subordinates. At his instance Jenkins preferred charges against General Robertson, and though these were very properly quashed by the President and the Secretary of War, Robertson, rather than remain under Jenkins' orders, resigned his command and was succeeded by Brigadier-General Gregg. In the Wilderness Campaign the Texas Brigade came up just in time to stop the rout of Wilcox's and Heth's divisions, and to drive back Hancock's pursuing troops. At Spottsylvania it was almost surprised on the evening of the 10th May by Upton's assault, but took no part in the desperate fighting at the "Bloody Angle" on the 12th May. Nor was it directly attacked at Cold Harbour on the 3rd June, although it contributed to the repulse of the Federal attack by pouring in a heavy fire upon their left flank. The brigade was relieved from duty in the Petersburg lines just before the explosion of the Burnside mine, and sent to the north bank of the James River, where it remained till the evacuation of Richmond, taking a prominent part in the engagements of the 29th September and the 27th October. General Gregg was killed during a reconnaissance in force on the 17th October, when the brigade lost more heavily than in any engagement since the Wilderness. He was the last officer holding the rank of Brigadier-General that commanded the Texas Brigade. The brigade when it surrendered at Appomattox numbered 557 officers and men.

A Short History of Burma. By S. W. Cocks. 229 pp., with 1 map, an introduction, index and chronological table of chief events. 8vo. London, 1910. Macmillan. 2s.

This little book gives the history of Burma in a concise tabulated form, commencing with the prehistoric period and early traditions and closes with the Annexation of Upper Burma on the 1st January, 1886. The two final chapters deal with Arakan and its population, and society and government under the Alaungpaya dynasty, of which King Thibaw was the last representative.

Marshal Berthier's Reports to the Emperor during the Campaign of 1813 (Rapports du Maréchal Berthier à l'empereur pendant la campagne de 1813). By X. 2 vols. 510 pp. and 423 pp. 8vo. Paris, 1909. Chapelot. 16s.

These volumes contain all the reports made to the Emperor by his Chief of Staff during the period 15th March to 31st December, 1813. Some of the documents are merely "covering minutes" transmitting the reports of subordinate officers and are of little interest, while others which exhibit the distribution of troops at different periods are of considerable historical value. The majority deal with purely routine matters placed before the Emperor for his decision, and they provoke amazement that it was possible for him to achieve success in war and govern half Europe when he must have been obliged by his centralized method of staff work to devote many hours and days to office papers. There are reports referring to him for decision appointments on the staffs of subordinate

Digitized by Google

generals, regimental promotions, recommendations for the Legion of Honour and hundreds of minor matters which might well have been settled by a man of Berthier's rank.

The following are specimens of the reports :—

(*a*). "Sire, the Prince de la Moskova requests :

(1) that Capt. Valicon of the 144th Infantry Regiment shall be transferred to the *Sapeurs ;*

(2) that Capt. Peradi of the 136th should become *adjudant de place.*

"He requests at the same time authority to send a lieutenant and a second lieutenant of the 145th to France for recruiting purposes.

"I have the honour to propose to your Majesty to authorize me to give the necessary orders for the execution of these different matters."

(*b*). "Marshal the Duke of Castiglione presents as likely to become a good second lieutenant, Mr. Ellena, ex-sergeant of the 67th, discharged in 1811 after three years' service on account of wounds.

"Mr. Ellena has recovered from his wounds and requests to rejoin the army ; he is 20 years of age.

"If your Majesty is pleased to grant him the rank of second lieutenant, he can be placed in the 7th Infantry Regiment, XIIth Army Corps."

(*c*). "I have the honour to place before your Majesty a letter of General Bruyère in which he requests the decoration of the Legion of Honour for Lieut. Nypels, 7th Hussars. This officer has been previously recommended by General Bruyère."

(*d*). "Sire, your Majesty has not yet given me orders for the Treasury Chest, which is escorted by the 4th Battalion of the 37th Light Infantry, and ought to arrive at Erfurt this evening, there to attend further orders : I request orders for the 37th if the Chest remains at Erfurt."

(*e*). "I have the honour to place before your Majesty a letter that I have received from Count Durosnel in which he reports the request of General Gersdorf for authority to withdraw four 12-pr. and four 6-pr. guns, forming part of the armament of Dresden and Neustadt ; these guns are required by the Saxon Artillery, which is about to take the field."

Some of the reports are merely marked "Approved. Napoleon" ; but others contain detailed directions ; the last for instance is minuted "Approved. Replace them by some siege pieces which can be taken from Torgau or Koenigstein. Dresden, 29th June. Napoleon."

THE TRIAL UNDER FIRE OF THE RUSSIAN ARMY IN THE WAR OF 1904–05 (Die Feuerprobe der Russischen Armee in Kriege 1904–05). By Richard Ullrich, Lieutenant in the Reserve of the German Army. 262 pp., with 29 illustrations and 8 plans. 8vo. Berlin, 1910. R. Eisenschmidt. 7s. 3d.

Seldom has a more instructive and fascinating book than this been published about a campaign. The author had to leave the German Army after some seven years' service, on medical grounds, just before the Manchurian War. He had previously mastered the Russian language and established friendly relations with many Russian officers, including General Orlov. When this officer obtained command of the 3rd Division (XVII. Army Corps), Ullrich received permission to join his headquarters as a guest. He arrived shortly before the Battle of Hei-kou-tai, took part in this action, and in the Battle of Mukden, and in the retreat on Tieh-ling. During the summer of 1905 he was attached to General Rennenkampf's Corps on the east of the Russian battle front. He also visited Vladivostok.

The author claims to be an impartial though candid critic of the Tzar's forces, but his story, which bears throughout the impress of the expert eye-witness, leaves a most unfavourable impression of the Russian Army. For the military reader the interest of

Digitized by Google

the book is twofold :—It proves the supreme importance of *moral*, and it contains details of tactics, engineering, administration, etc., which are of value as coming from a professional soldier and free-spoken narrator.

Whilst praising the bravery of the officers and men of a heavy battery and of some infantry at Mukden, as well as of Rennenkampf's dismounted Cossacks, he passes severe strictures on the cowardice, drunkenness and luxury of many generals and officers and declares the high estimate in which the Russian soldier is held to be unjustifiable. General Rennenkampf, however, is repeatedly cited as a brave man and good disciplinarian. Of the Russian soldier the author says that his character is too dependent for present-day fighting, and accordingly he lays emphasis on the special importance of personality amongst leaders in the Russian Army. He draws a vivid picture of indiscipline and panics after Mukden, but praises the conduct of several units, especially the mounted scouts, in this battle, and declares that the charge of advancing in unduly dense formations to be groundless as far as the infantry at Mukden were concerned. The staff officers according to him were too theoretical, and many, appointed on account of family influence, were grossly incompetent. The infantry officers he found listless and lethargic, whilst throughout the commissioned ranks bitter personal animosities, self-seeking and medal-hunting were rampant. Whilst defending those at the front against the charge of luxurious living, he portrays in lurid colours the rioting and debauchery that went on behind, and the outrageous ill-treatment of the harmless Chinese. From this the author draws a moral : "Be strong," he says, "for, whilst man remains what he is, the weak will be trampled on."

Very interesting are the details about artillery fire ; the author was favourably impressed with the fire-control system but not with the tactics. Shrapnel fire appears to have given poor results on the whole, but the moral and material effect of Japanese 11" shells was great.

The medical organization appears to have been fairly good, though the insanitary camps and filthy habits of officers and men are several times mentioned. Enthusiastic encomiums are passed on the Russian field kitchens. Two instances are given of criminally careless work by reconnoitring officers ; their shirking methods and garbled reports had far-reaching results at Mukden. He blames the Japanese for lack of enterprise after Mukden and declares that they could then have captured and destroyed a great part of the Russian Army and imposed their own terms of peace. The Japanese higher leading on the whole, and their infantry tactics come in for warm praise. Descriptions, with rough sketches, are given of Russian trenches and head-cover, the respective merits of various types being discussed. Wire entanglements are criticized as disclosing positions, besides being easily destroyed by artillery. The author prefers trip wires, of which he gives a sketch. Many useful hints are given on intelligence duties ; and the value of close reconnaissance before attack is illustrated by Japanese and Russian procedure, especially the former.

Of machine guns he says that at short ranges and in pursuit they effect more than artillery, but they are of little use against troops who are sheltered by banks or buildings. Strong emplacements should be made for machine guns, and artillery should not grudge ammunition in its attempt to put these weapons out of action. Machine guns should be controlled by the divisional commander, supervised by a specially trained officer, and allotted to regiments as required.

Good glasses are a *sine quâ non* for all officers of an army, and the enemy's tactics must be carefully studied so as to draw correct inferences from what is seen.

Digging in the attack, he says, provides some cover, and a rest for the rifle ; it also hides from view, and consequently the enemy's reinforcements will not know where to aim.

The general moral of the book is : Character is more important for leaders than attainments, although sound study is a necessary preliminary ; in tactics the form matters less than adaptation of means and methods to the needs of the moment. Strict discipline is essential.

The well-known military writer, Colonel Balck, contributes an introduction.

Digitized by Google

POLITICAL.

THE NATIVE STATES OF INDIA. By Sir William Lee-Warner, K.C.S.I. 406 pp. and index. 8vo. London, 1910. Macmillan. 10s.

This valuable addition to the literature on British India is a work of more than passing interest. The relations of the Native States of India to the Supreme Government present a problem of unusual complexity, and it can be easily understood that the feeling between the Government of India and the hereditary rulers and nobles of the Native States has a vast influence on our policy in India. Hence, a study of the question cannot fail to be of interest, and this particular book with all the wealth of detail and information imparted by Sir William Lee-Warner, is one that will be read by all students of the subject.

THE POSITION OF FRANCE WITH REGARD TO GERMAN EXPANSION (L'expansion de l'Allemagne et la France). By Henry Andrillon. 298 pp. 8vo. Angoulême, 1909. Imprimerie Militaire L. Coquemard.

This is an interesting study. The author regards the expansion of the German Empire as the greatest danger to Europe at the present time, and draws a graphic picture of the superiority of Germany to her neighbours. He shows that Germans look upon France and Great Britain as decaying races and degenerate nations, who have passed the zenith of their power and are now on the downward path. He does not, however, himself believe this to be the case, but says that Frenchmen at any rate only require to be aroused from their lethargy and to be made to realize their danger before it is too late. He gives a detailed description of German education and intellectual thought, and shows how much of Germany's success is due to her schoolmasters and professors. The Germans instil patriotism, sense of duty and loyalty into their children, whilst this important duty is neglected, nay even forbidden, in France and Great Britain.

STRATEGICAL AND TACTICAL.

THE RUSSO-JAPANESE WAR. Lectures given at the Russian Staff College. Translated from the Russian, Parts VII., VIII., IX. (Conférences sur la guerre Russo-Japonaise faites à l'Académie d'état-major Nicolas. Traduit du Russe, Fascicules 7, 8 et 9).

Part VII.—"A strategic sketch of the offensive action by the IInd Manchurian Army in January, 1905." General Mishchenko's Mounted Detachment during the offensive action of the IInd Army in January, 1905. 209 pp., including 4 appendices, 12 sketch maps. 8vo. Paris, 1909. Henri Charles. 4s. 2d.

Part VIII.—"The Battle of Mukden." 446 pp., including 16 annexures. Table of contents, plans and annexures. 16 plans at the end of the book. 2 appendices (orders of battle of Russian and Japanese Armies). 8vo. Paris, 1909. Henri Charles. 8s. 4d.

Part IX.—588 pp., with 4 maps and Table of contents. 8vo. Paris, 1910. Lavauzelle. 8s. 4d.

HOW TO SOLVE A TACTICAL PROBLEM (Comment on résout un thème tactique). By Commandant Savatier, of the French Army. 216 pp. 8vo. Second edition. Paris, 1910. Charles-Lavauzelle. 3s. 4d.

In a preface the author warns students against striving to solve tactical problems in conformity with certain fashionable ideas; each solution should be justified by a careful

Digitized by Google

logical reasoning and based upon common sense; but, he says, a knowledge of certain principles is a necessary preliminary.

The book consists of two parts. In Part I. solutions are discussed in detail, but no orders are written. In Part II. orders and instructions are given in each case. Throughout the book the French predilection for strategic advanced guards and distribution in depth is evident. The following principles evolved will be of interest to students of tactics:—

Advanced Guards. When a large unit advances in several columns one tactical advanced guard only should be formed, so as to ensure unity of direction. The other columns merely throw out small advanced guards ("de *sûreté matérielle*").

Even columns following others must throw out advanced guards; and however far back the column, its artillery should always be preceded by some infantry. An advanced guard preparing for action does not necessarily halt except when in presence of manifestly superior forces. On other occasions it continues to advance with caution. Divisional mounted troops must furnish all detached infantry bodies with *personnel* necessary for establishing communication laterally and from front to rear. An advanced guard must hold or attack the enemy; the main body manœuvres. Chapter XII. contains an instructive example of the necessity of a common school of thought amongst leaders: different protective detachments may receive from Headquarters separate tasks but necessitating co-operation; each officer commanding a protective detachment should, on receiving his orders, be able to assume that other commanders will act according to certain principles, and on this assumption he will found his own plan.

Flank Guards. First put "eyes" in the threatened direction; then protective bodies, each with a definite task; economize detachments. Stationary posts are best nearest the enemy. Make support of a flank guard as strong as possible.

Cavalry with small mixed forces is usually divided into (*a*) small reconnoitring parties; (*b*) distant protective detachments; (*c*) close protection: (*b*) should be as strong as possible.

Outposts must always entrench, however short a time they may remain in position. Entrenchments economize men.

Reconnaissances. Send them to certain points, *not* to sweep certain areas. Tell them what points they are to make (each day when they go away for several days), and whence the first report should be sent.

The description of a "centre de renseignements" (compare Cavalry Training, Secs. 140, 147) is interesting. *Personnel* recommended by author:—G.S. officer, three or four motor cyclists or cyclists, some mounted men. All troops must know where it is.

Buildings, villages and hamlets are useful in ordinary fights, but should be avoided in rear-guard actions, as defenders will probably suffer from shell-fire when leaving them.

Marches when near the enemy. Adopt rectangular formation, one side roughly parallel to proposed front of attack. If ground precludes this, form small marching columns.

Defence of posts. Headings for orders:—Task to fulfil; line to be occupied; rallying position (he mentions this in ordinary operation orders); division into sections; distribution of troops, where work has to be carried out, add tabular statement giving site, nature of work, garrison (of a post work or trench), working party, tools required, remarks.

Orders. Always allot a task thus:—Battalion will go to —— object:—To enable artillery to occupy ——. Orders to cavalry and detached bodies form an exception to the above. Telephones are unsuitable for long orders. When time is mentioned he recommends that words in brackets should follow figures, thus:—4.30 (four thirty a.m.). At the foot of an order, distances which orderlies have to traverse should be noted, thus:—By motor cyclist to X (— miles).

Unfortunately the book contains no maps. The majority of problems refer to the Commercy and Bar-le-Duc districts of the French $\frac{1}{50000}$ map (each of above contains four sheets). The problem in Chapter XVII. requires the Sarrebourg N.E. and Sarreguemines S.E. sheets; the last problem, the S.E. and S.W. sheets of Tonnerre. This detracts from the usefulness of this otherwise valuable work for foreign readers.

Digitized by Google

TRAINING AND EDUCATION.

GENERAL PRINCIPLES FOR THE EMPLOYMENT OF LARGE UNITS IN WAR (Norme generali per l'impiego delle grandi unità di guerra). Italian General Staff. 133 pp., with 5 plates. 12mo. Rome, May, 1910. Voghera. 11d.

This handbook replaces one on the same subject issued in April, 1903, and represents the latest views of the Italian General Staff on the leading of armies containing two or more corps. Grand tactics only are dealt with, the principles of minor tactics being contained in the handbooks of the various arms, and in the official treatises on marches and cavalry exploration.

As mentioned in the preface, the principles here laid down are for the guidance of the higher leaders, but since all the other tactical handbooks are founded upon this one, the book should be carefully read by officers of all ranks.

TRAVEL AND TOPOGRAPHICAL.

LEAVES FROM AN AFGHAN SCRAPBOOK: THE EXPERIENCES OF AN ENGLISH OFFICIAL AND HIS WIFE IN KABUL. By Ernest and Annie Thornton. 218 pp., with an index and numerous illustrations and photographs. 8vo. London, 1910. Murray. 8s.

A lightly written and attractive book which throws some sidelights upon life in Afghanistan and Cabul. Some very interesting incidents are related, not the least of which is the account of how the Amir stopped all talk of a "jehad" against the British during the troubles on the North West Frontier in 1908.

CORRESPONDENCE.

MILITIA POST, MIRANSHAH, TOCHI VALLEY.

DEAR SIR,

With reference to page 5 of the *R.E. Journal* for July, 1910, I am afraid a misunderstanding has occurred. The note was not written by me but by Capt. A. M. Moens, 52nd Sikhs (F.F.), who was at the time second in command of this corps. I merely forwarded it to the A.C.R.E. as he had asked me to send him such a note. I asked Capt. Moens to write it, as he had been a long time in the valley, while I had only come comparatively recently.

I had no idea it was to be brought out *in extenso* or I would have been more careful to leave no doubt about the authorship. I do not wish to take the credit for what I did not write, and hope you will correct the error in your next issue.

Yours faithfully,

D. H. MCNEILE, *Major*,
Comdt., N.W. Militia.

Miranshah, 12th October, 1910.

The Editor, *R.E. Journal.*

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

UNIVERSITY OF ILLINOIS-URBANA
3 0112 118408357

Digitized by Google